

THE PRACTICAL
SENIOR TEACHER

VOLUME IV

EDITED BY
F. R. DODD, F.R.A.S.
MA, B.Sc.

THE PRACTICAL
SENIOR TEACHER



BOOKBINDING PROJECTS

Frontispiece

THE PRACTICAL SENIOR TEACHER

A GUIDE TO THE MOST MODERN METHODS OF TEACHING
IN SENIOR SCHOOLS

CONTRIBUTED BY LEADING AUTHORITIES IN EVERY BRANCH
OF SENIOR EDUCATION, WITH NUMEROUS ILLUSTRATIONS,
SCHEMES OF WORK, AND PRACTICAL SUGGESTIONS

Edited by F. F. POTTER, M.A., B.Sc.

DIRECTOR OF EDUCATION FOR THE COUNTY OF CHESHIRE; FORMERLY H.M. INSPECTOR OF SCHOOLS;
AUTHOR OF "COMMON-SENSE ENGLISH," "COMMON-SENSE ARITHMETIC," ETC.

Associate Editor: G. M. PLACE

Foreword by SIR T. PERCY NUNN



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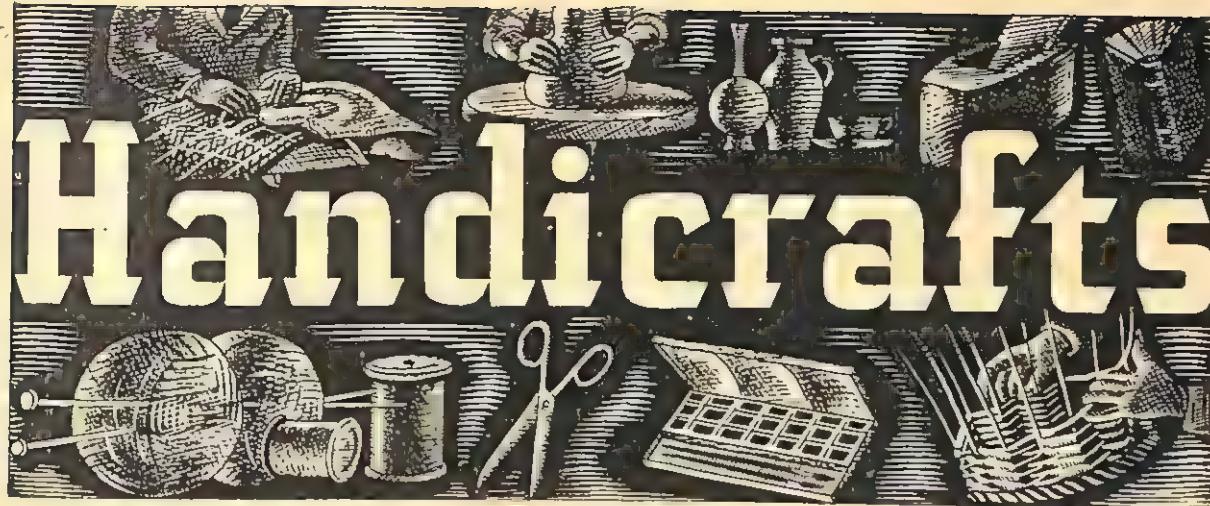
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THE ORGANIZATION OF HANDICRAFT

HANDICRAFT in its various forms is now so firmly established as an important part of the curriculum of the Senior School that it is essential for every teacher to have some clear and definite ideas about its organization.

Until comparatively recently the whole matter, excepting in so far as it concerned established forms of handicraft which were generally taught in detached "centres," has been one of experiment, depending for its success upon fortuitous circumstances such as the enthusiasm or skill of a particular teacher, or upon especially favourable conditions of accommodation, equipment, and time available.

But, although it would be entirely wrong to say that the period for experiment in these practical activities has passed, or indeed that it should ever pass, it need no longer be assumed that handicraft, to obtain an adequate place in the curriculum, has invariably to contend against difficulties imposed by lack of accommodation, equipment, and qualified teachers. No doubt these difficulties still exist in some measure, but it is equally true that there has been a great extension and development of all forms of school handwork during the past few years, coupled with an increase in the facilities for teachers to acquire skill and for the subject to be practised in the schools.

From this development certain general principles have emerged which obtain wide acceptance among teachers of experience.

Illustrative Handwork

The first is the clear distinction that is now drawn between illustrative handwork and the definite practice of a handicraft—between the "instrumental" and the "substantive" aspects of educational handwork.

Illustrative handwork, undertaken in order to clarify and reinforce ideas and to facilitate learning in various school subjects, has lost none of the values formerly claimed for it. Although it is of far more importance to Junior than to Senior pupils, it has its place at times in all parts of the Senior School, particularly in certain subjects such as mathematics. Practical science may be regarded as largely consisting of a kind of illustrative handwork. The making of maps, diagrams, and models for geography; of models for history; of "properties" for dramatic work—all these are forms of illustrative handwork which, especially with pupils of the "C" grade of intelligence, will continually be found necessary as part of the normal teaching and learning technique in these subjects.

A Head Teacher may possibly find it necessary to set aside a special time, and even a special teacher, for illustrative handwork of this kind; but as a rule the more that this work is separated from the subject to which it is related, the less effective it is likely to be. If this type of handwork is to be of the greatest value as an aid to learning, it should be taken as and when

required in the normal course of the lessons to which it belongs, and by the teacher of the subject concerned.

It is hardly an exaggeration to say that illustrative work of a poor technical standard, taken by the teacher of the subject being illustrated, in the ordinary course of the lesson, is far more educationally valuable than beautifully finished illustrative work made under the guidance of another teacher during a special period set apart for it. The aim of this form of handwork is *illustration*—it is used to drive home a point or to make clearer a visualized idea. Technical excellence is a secondary, and may even be an undesirable, aim, since its achievement may necessitate the use of valuable time. The products of this type of work should almost invariably be of a temporary character, to be destroyed soon after the need for them has passed.

Thus the Head Teacher will avoid making special time-table arrangements for illustrative handwork, but on the other hand he (or she) will expect the class teachers to use it freely whenever appropriate, and will see that they have the facilities for doing so.

The Teaching of Definite Handicrafts

The other aspect of school handwork involves activities having a totally different aim, a far more systematic arrangement, and a much higher standard of technical achievement. In brief, it is now believed that the practice of some of the basic forms of mankind's handicrafts, involving the study and adaptation of traditional methods and having as its aim, in the eyes of the pupils, the *production* of articles of use and beauty, is a valuable instrument in education. It is certainly one that must play a large part in the work of the Senior School, and it is for that reason that this volume of *The Practical Senior Teacher* deals entirely with various forms of genuine handicrafts which have been found suitable for Senior Schools.

Problems of Organization

The inclusion of such work in the curriculum presents many problems to the thoughtful

Head Teacher. There is the question of the time to be given to the subject; the choice and variety of crafts to be practised; the general arrangement of the schemes of work; their adaptation to pupils of different ages and (equally important) of different grades of intelligence. Other problems will arise concerning teaching methods; the routine of craft lessons; the supply of materials and the disposal of the products; the recording, testing, and assessment of the pupils' achievements; and the parts that individual and group work will respectively occupy during the handicraft course. Last but not least is the problem of the co-ordination of these activities with the other branches of school work.

If the fullest value is to be gained from this "stream" of constructive activity which runs through the curriculum, it must be continually related to the parallel activities in the school—the literary and historical, artistic, mathematical, and scientific aspects of school work. To the crafts these subjects may bring stimulus and inspiration; from them they may obtain much material for study.

Schools containing Senior pupils vary widely in character. In a large urban school a class may consist of pupils all of the same sex, and approximately equal in age and type; in another boys and girls may be taught together, but still be well classified as to age and intelligence; and so on, through an infinite variety of conditions, to the small rural school in which one class may contain boys and girls of widely differing ages and capacities. Thus each teacher responsible for the organization of handicraft must face his or her particular problems, in the solving of which guidance only of the most general character can be given.

The Time to be Given to Handicraft

Of the weekly $22\frac{1}{2}$ hours which is available in most Senior Schools for secular instruction, the proportion allotted to practical activities may range from about one-fifth ($4\frac{1}{2}$ hours) to one-third ($7\frac{1}{2}$ hours) according to circumstances. For girls this always includes needlework (usually about 2 hours) and often domestic crafts ($2\frac{1}{2}$ – 3 hours), while for boys it may include the $2\frac{1}{2}$ hours spent at workshop handicraft in wood

or metal. In remote rural schools gardening may take the place of the workshop handicraft; in other schools it may supplement it for certain types of pupils, usually those who succeed best at subjects of a practical nature.

Where the pupils are fully catered for in these old-established forms of practical work, they are now generally given an additional 1½ to 2 hours weekly at some other craft, increasing this amount for the "C" pupils but never entirely omitting it for the "A" pupils. Schools or classes with inadequate facilities for domestic or workshop crafts should endeavour to compensate for this in some measure by an increased allowance of time for other crafts.

The Choice of Crafts

Tradition and common sense settle upon needlework as one craft in all girls' schools; material facilities generally determine whether some of the total time must be given to domestic subjects, or, for boys, to workshop handicrafts. Thus in practice all that most teachers are called upon to decide is upon the nature of the additional crafts to be taken.

Woodwork and metalwork require special rooms and much equipment; technical drawing is not of itself a craft. With these exceptions the teacher has the whole range of crafts described in this volume from which to choose.

The Main Groups of Crafts

The selection should not, however, be merely a matter of choosing unrelated crafts here and there from the wide variety. There is one group of crafts associated with the making and manipulation of textiles; this includes needlecraft, knitting, embroidery, soft toy making, weaving, and rug making. Raffia work and basketry are closely related to the textile group; some raffia weaving should certainly be included as a preliminary to weaving with cotton or wool, as well as being associated with needlecraft in the form of raffia stitchery.

Another group, "Book Crafts," includes every activity involved in the making and storage of written, printed, or drawn records. In this group are bookbinding, with its preliminary

constructive cardboard work, lettering, lino-block pattern and picture printing, and letter-press printing.

Only pottery and leatherwork stand alone, unrelated to other crafts. "Rural Handicrafts" is a term applied to that variety of handiwork, mainly in wood and metal, which can be done with a minimum of workshop equipment, and the products of which are especially suited to the garden and countryside.

Since any of these crafts can be carried on with inexpensive equipment in an ordinary classroom, or in a very simply equipped "practical room," the final choice may be influenced in some measure by the tastes and ability of the individual teacher. It is the Head Teacher's duty, however, to see that the pupils do not merely attempt one craft after another without reference to any sequence or relationship between them. As far as possible the main course should be a group of related crafts; some work in crafts of other types may be added to make good certain deficiencies. For example: girls, for the reasons given below, may add simple book crafts to a main course of textile crafts, or, conversely, boys may add basketry, leatherwork, or decorative metalwork to a main course of book crafts. These additions should not, however, be made at the expense of the progression of work in the principal group of crafts, which in itself contains ample variety, as the sections in this volume will indicate.

Crafts for Senior Girls

For Senior Girls an extension of the needle-craft into other textile crafts is most appropriate. If, however, the girls' handicraft is confined entirely to these, with possible excursions into raffia work and basketry, a risk is run that their practical work will lead to insufficient training in accuracy and precision, which are not conspicuously demanded by these crafts. It is therefore desirable to include, at least during a part of the three years' course, some work in simple book crafts. The pupils whose main interest lies in bookwork will probably go further with this than the "practical" groups.

There is a growing realization among teachers of Senior Girls that their pupils, most of whom

it is natural to assume will in time be "homemakers," should have some training in the use of the domestic toolbox, i.e. in those simple "handyman's jobs" which are so often needed in every home. Thus if possible there should be included in the girls' handicraft course, at least during the final year, an hour or so of "domestic handicrafts." This does *not* mean a formal course of woodwork, involving the use of planes and chisels which no-one with limited training can possibly hope to keep in working order, but such things as the use of hammer, bradawl, gimlet, pincers, pliers, and saw; the manipulation of nails, screws and other simple hardware; simple painting and varnishing (including the care of the brushes, often so woefully neglected), and similar household tasks for which the prospective housewife may well fit herself.

Crafts for Senior Boys

Most boys will, during at least a part of their Senior School career, receive some instruction in a workshop handicraft—woodwork or metal-work, or both.

For a handicraft in addition to this the various branches of book crafts are by far the most generally suitable. Only in exceptional circumstances will textile work in the shape of weaving be appropriate for Senior Boys, though raffia work and basketry may be taken to introduce variety in materials. In book crafts, constructive work may range from the making of the simplest folders to the binding of a multisection book; lettering from the small script-written label to advanced manuscript writing; pattern printing from the arrangement of simple stick-printed units to the preparation and use of complicated lino-cut units; lino-block printing from easy devices and initials to pictures for magazine illustration; and letterpress printing from the simple greeting card to the school magazine. In such a catalogue of possibilities no teacher can fail to find enough constructive and decorative work, all related to the one purpose, for a three-years' course for Senior Boys.

In some Senior Boys' schools a course of light decorative metalwork, using mainly sheet copper and brass, may be chosen to supplement the workshop handicraft. Such work can be done

with relatively inexpensive equipment in a very simply equipped room. Its main drawback is the noise, which necessitates its being done either at a time or in a place separate from the instruction in other subjects. Directly this type of metalwork is developed beyond certain rather narrow limits, however, it requires heavier and more costly equipment and passes into the category of a craft requiring a special workshop.

Special Difficulties of Schools with Mixed Classes

The problem of making a time-table for a school in which boys and girls are taught together is notoriously difficult, especially in connection with subjects which are taken only by pupils of one sex. The simpler work in constructive book crafts, being needed by girls as well as boys, is best taken in mixed classes. If workshop handicraft for the boys can be synchronized with the domestic training of the girls there is still the difficulty of "balancing" the girls' needlework by suitable practical activities for the boys. Technical drawing may account for some of the time, and probably the best way of using the remainder will be to give the boys work of a wider scope in book crafts, including more pattern stamping and block printing, leading to the use of simple presses and letterpress printing. Such arrangements, of course, require the grouping of the boys from two adjacent classes, with a corresponding grouping of the girls, unless the staffing of the school is generous enough to allow of half-classes being taken.

Schemes of Work

While the Head Teacher will rightly permit the details of work in various crafts to reflect the individuality of the teachers concerned, he or she should on the other hand definitely insist upon written schemes being prepared for work in any craft. If a handicraft is worth doing at all it is worth taking seriously enough to justify a statement of its immediate aims and the methods it is proposed to pursue.

All successful craft teachers in Senior Schools

agree that a high standard of craftsmanship should be aimed at, and that this can be reached only if the methods to be followed, especially in the early stages, are very carefully thought out. This early practice in technique may sometimes be applied to really useful articles, but at other times it will be necessary for mere exercises to be set in order that the fundamental operations of the craft can be quickly mastered. Thus the scheme should show a carefully graded sequence, and should avoid over-rating the pupils' capacity to design or execute original work until they have had sufficient technical experience.

Some of the considerations which should govern the schemes in crafts for the whole of the Senior School have already been stated, but in addition the Head Teacher must bear in mind the suitability of the schemes for pupils of various types.

Much experiment remains to be done before we can claim to have reached the stage where we can generalize with certainty on the best methods to be employed when teaching crafts to backward pupils. As far as experience goes at present, however, we are justified in saying that all the schemes must include early exercises in technique, but that those for the most intelligent children will generally cover more ground, and reach the stage where some degree of original work is demanded much sooner, than those for the more backward pupils.

Nevertheless, the schemes for the "C" groups, though very clear in defining the demands that will be made upon the children, must be regarded as extremely "elastic"—capable of change, acceleration, or slowing-down as the work progresses and the capacities of the pupils in these new activities become known.

Other matters, of which lack of space forbids more than a mention, are: the steps to be taken to stimulate the pupils in the later stages to attempt original, or partly original, work; the method to be adopted to train the pupils' taste in the use of appropriate decoration; and the facilities offered by the scheme for differentiation between fast and slow workers. All these must be the concern of the teacher who prepares, and of the Head Teacher who oversees, a scheme of work in handicraft.

Teaching Methods

The most important maxim for the teacher of a craft is—"Example is better than Precept." This is particularly true of the early training in technique. In other words, *demonstration*, accompanied by a few well-chosen words of explanation, goes infinitely further than merely telling the pupils how the work should be done. Children rarely have a fully-developed power of appreciating and exactly following an involved explanation, such as is necessitated by many craft operations. Moreover, it is *literally impossible* to explain in words the exact mode of procedure for many tasks in the crafts. The reader who doubts this should try to frame an exact verbal description of, say, the process of knitting or of using a plane.

"See how I do it, then try it yourself," must be the method until the child begins to feel the mastery over his material. Then, and then only, can his creative impulses assert themselves in original work. So the old craftsmen taught their apprentices, and so must we teach our pupils if their fullest development is to be assured.

The teacher who is himself (or herself) thoroughly competent in a craft speedily finds how easy it is to gain the pupils' admiration and respect for the way in which a piece of work, so hard for the novice, appears so easy in the teacher's hands. There is no more potent influence in causing children to emulate fine work than the murmur of approval called forth by a "slick" and workmanlike demonstration.

How far the teacher will analyse the various processes and teach them step by step must depend upon the capacity and experience of the pupils. Beginners, especially in the backward grades, may need each step to be clearly and perhaps repeatedly demonstrated before proceeding to the next; pupils with more experience, and the more intelligent ones, may quickly grasp an understanding of a complicated sequence of operations after having seen them done only once.

If a satisfactory scheme has been drawn up, even if it is only an experimental one, to be modified by the novice in the light of subsequent experience, the Head Teacher's chief task in

supervising the teaching is to see that the spirit of the scheme is faithfully followed. Slovenly work, jumping from one problem to another without proper preparation, carelessness about design and decoration, must be avoided at all costs. Different teachers will have different ways of achieving these ends; no two craft classes will be identical in detail, for no subjects present such a variety of situations during their teaching as do the crafts. A maxim which all should follow is that it is better to go slowly, and to get work of a good standard, than to rush ahead with inadequate training and to let the pupils be satisfied with work of a poor standard of craftsmanship.

RECORDS AND ASSESSMENTS

Since craftwork consists almost entirely of individual activity, it is important for every craft teacher to keep records of the progress of each pupil. Such records need not be elaborate, and can be devised in tabular form so that the teacher can see at a glance which children require additional practice in certain operations, and which can go ahead with the minimum of guidance. The capable teacher requires no written record to identify the few cleverest and the few dullest pupils in his class, but how many teachers can speak with equal certainty of the progress of the "average" pupils who form the majority in a class of 40 or 50?

It is well from time to time, say at least once in every term, for the teacher to "take stock" of the pupils' attainments in their craft. This is best achieved by a simple test well within the capacity of most of the pupils, and *done against time* so that the fastest worker (who is also usually the best) gains marks for his speed as well as for the quality of his work. The test should usually be a test of workmanship only—of the ability to execute a simple specified operation, as it is exceedingly difficult for the teacher to arrive at a fair assessment of the pupil's performances if the test involves original design or demands special inventiveness.

CO-ORDINATION OF THE CRAFTS WITH OTHER SCHOOL WORK

In an earlier paragraph stress was laid upon

the importance of co-ordinating handicrafts with other branches of school work. Only thus can the crafts exert their full influence as instruments of culture.

Art is the subject which should most obviously be related to the artistic crafts, by which term one may designate most of the crafts mentioned in this volume. Indeed, the border line between art and craft is hard to define. Drawing of some kind is a necessary preliminary to any creative work needing careful planning. The craftsman can plan correct *constructions*, but, except by a study of fine examples, can get little guidance from the technique of his craft in deciding upon matters affecting the *appearance* of the finished object. Fine form and proportion, colour, the devising of ornament, and the arrangement of pattern—all are points essential to the design of a piece of craftwork, and subjects which can best be studied in the art course. One important value of handicraft in education is the opportunity it provides for developing a sound taste for simple, well-proportioned, and pleasing objects. This opportunity can only be grasped to the full if there is constant co-operation between art and handicraft.

Mathematics and science can from handicraft obtain many problems for study; to handicraft they can bring much help in facilitating calculations and technical methods.

The great part that tradition—the accumulated experience of the race—plays in the crafts is apparent to any serious worker in them. Conversely, the student of history can gain much from a consideration of the development of the crafts. Thus the place of the crafts in history—the lives and work of craftsmen at various periods, and the effect of changes in the crafts upon the progress of civilization (e.g. the growth of printing; the development of spinning and weaving)—all are valuable subjects for study in the history course.

Taken in the proper spirit, handicrafts can contribute many valuable factors to the education of the Senior School pupils. Not the least of these is the opportunity which it gives them of experiencing the joy and satisfaction of "making a good job" of their work, whatever it may be.

THE RURAL ASPECT OF HANDICRAFT

THE object of this chapter is not to discuss the aims and methods of manual instruction, nor to lay down a scheme of instruction in woodwork and its allied crafts, but rather to suggest how the more orthodox methods of manual instruction can be modified to suit the needs of a rural school containing senior children.

Boys and Girls in Rural Areas

The time allotted to Handicraft for girls in rural areas must necessarily be largely allotted to Domestic Science and Needlework.

It is surprising what interest can be added to the Needlework, if some particular feature such as smocking or quilting can be studied and made more or less traditional in the school.

The close relationship between the work in a school garden, by both girls and boys, and the use by the girls of the products of this work in their Cookery Lessons (jam and jelly-making, fruit and vegetable bottling and canning, the making of pickles and chutney) should be clearly established in the minds of both boys and girls. Co-operation between the boys and girls may be possible in a Handicraft lesson on, say, simple repairs to domestic utensils.

In a few girls' schools nowadays the Handicraft curriculum includes a course of Carpentry. Though in many schools it will not be possible for the girls to share in the Carpentry projects here suggested, they might quite well take an interest and an active part in the assembling of, say, some of the Science apparatus.

Materials

One point that must be emphasized is that, when dealing with pupils from rural homes, the question of expense for the materials used is a very important consideration. The pupils should be trained, and encouraged, to use and adapt any material they may find at hand. New and expensive timber and other materials should only be used when there is no other

supply available. This does not mean that rough and shoddy material or workmanship should be allowed. It should be stressed that the countryside must not be spoiled by the erection of unsightly sheds and hen-houses made of rough, unpainted, packing-cases or motor-car crates. These cases and crates, however, may have their uses, and the subject of "second-hand" material will be returned to later in this chapter.

Scope of the Work

In considering the subject of rural handicrafts, one presupposes the existence of a practical instruction room or building, fitted with suitable work benches, and a fairly generous equipment of tools. The practical room must not, however, be considered as the only "workshop." In every rural school, the garden, the farm, and the countryside generally, including the children's homes and gardens, must be considered as parts of the school.

The whole aim of instruction in this subject should be to produce a general handiness in the pupil, and any hard-and-fast scheme would be impossible to draw up or to work. It is really essential, however, to follow the more orthodox methods of instruction for pupils on their first admission to the practical room. Once the use of the commoner and more generally used tools has been properly understood and put into practice, then the special tools would automatically come under consideration, as and when they are required. A series of lessons on the planing and preparing of small pieces of timber and the making of joints of various kinds which will have no further use tends to make the boy lose interest. All boys want to make something when they enter the handicraft room, and this is a healthy craving which should be satisfied as soon as possible. Many boys who fail dismally in practice work, with small pieces of material, succeed when given something solid to work upon. Even in the preliminary lessons

the boys' interest can be aroused at once by getting them to make something that can be of use in the school garden or at home.

First Projects

A large wooden label (see Fig. 1), which can be used in the garden for naming plots or special



FIG. 1

Large Wooden Label

*Suitable for first exercise in handicraft.
The upper part to be painted white,
the lower half creosoted.*

Scale 1 in. = 8 in.

fruit trees, will provide all the necessary practice in the use of the really essential tools, besides providing practice in drawing and interpretation of the same. Even for this simple object it will be seen that the pupil is initiated into the use of the following tools: rule, hand-saw, plane, try-square, tenon saw, and chisel. Another easy model which will appeal to the boy who keeps pets of any kind is a simple feeding trough, illustrated in Fig. 2.

As mentioned before, a series of lessons on the making of various joints is undesirable. There is, however, one joint that might be made the subject of a special lesson for all pupils, and pieces of waste timber can be employed quite usefully for the purpose. This is the mortise and tenon joint—a joint which is constantly required in all kinds of constructional work in connection with garden fittings and school apparatus.

A Progressive Scheme

Once the boys have become accustomed to handling the simple tools they should be encouraged to suggest and make articles suitable for

use in their homes and gardens, or in the school. The teacher must, however, be ready to help their selection, in order to keep their inclinations within the range of their abilities. Many tools and articles of use in the garden and on the farm can be made quite easily in the school handwork room, but space does not permit of dealing with them in detail. A few might be mentioned, such as the following—

1. Plant and plot labels of various shapes and sizes.
2. Dibbers, made either from new material or from fork or spade handles, which have been broken.
3. Garden-line winders.
4. Drill markers.
5. Nesting boxes for birds.
6. Garden ladders.
7. Pair of steps.
8. Fencing and garden gates.
9. Garden frames.
10. Hen-houses and poultry appliances.
11. Pig-sties and feeding troughs.
12. Bee-hives and appliances.
13. Fitting up a shed as a fruit and vegetable store.

Many of the above can be treated as co-operative pieces of work, the younger boys doing the more simple parts, and the older boys doing the more difficult joints and the final assembling. In addition much of the apparatus for school games and athletics can be made by the boys, and here again second-hand material

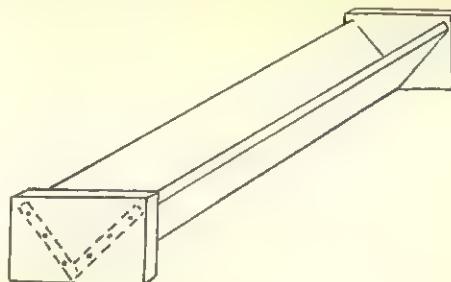


FIG. 2

A Simple Feeding Trough

Scale according to size of animal it is required for.

can be utilized for the making of hurdles, stool-ball posts, corner-flags, etc.

So far this chapter has been mainly concerned with the making of articles which may be broadly classed under the heading of Wood-work, but there are many other ways in which the Practical Room may be utilized in connection with rural subjects, and these ways will now be dealt with under their various headings.

Rustic Work

The best kind of wood to use for this is fir poles, for seats, fencing, arbours, summer-houses, arches and pergolas. If more crazy effects are desired then it is better to employ crooked and odd shaped branches, preferably of oak. These can often be obtained for nothing

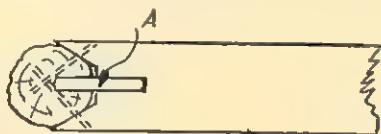


FIG. 3

Joint for Two Poles

To be used to fix poles at right, or nearly right angles, as in a Rustic Seat. The dotted lines indicate nails or screws. A is a wooden dowel for extra strength.

during tree-felling operations. Much of this kind of work is considered as rough carpentry, but there is room for some very careful work and accurate measuring—particularly in the making of joints. When two poles are to be fixed at right, or nearly right, angles, as in

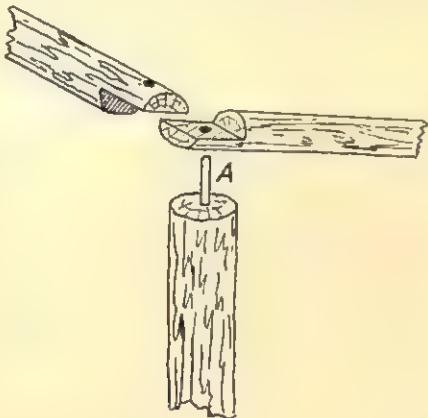


FIG. 4

Corner Joint

For corner of Rustic Shelter or Summer House. The dowel at A could be replaced by a long nail or screw.

garden seats, the best kind of joint is the one illustrated in Fig. 3. A useful joint for the corner of a rustic shelter is shown in Fig. 4. Where one pole is resting on another it is better to cut away a portion of the upper one, and leave the lower one intact and better able to bear any strain. (See Fig. 5.)

To create an interest in bird life one of the most useful aids is a series of bird boxes in the

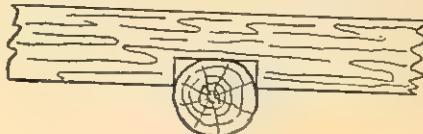


FIG. 5

Procedure Where One Pole Rests on Another

garden. These can be of rustic design as illustrated in Fig. 6, or of more formal design as in

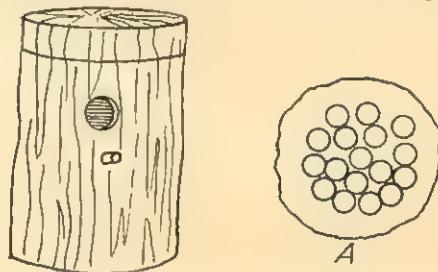


FIG. 6

Rustic Nesting Box

A shows the method of clearing the cavity by drilling a series of holes close together with an auger or large drill. The remainder can be cleared with chisel and gouge.

Fig. 7. In any case, an alighting platform or perch (or both) should be supplied. The lid in

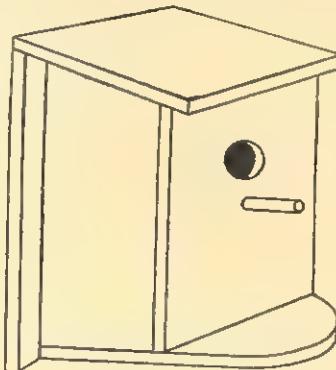


FIG. 7

More Formal Design for Nesting Box

The hole should not be big enough to allow sparrows and other marauders to enter.

either case should be hinged to allow for observation.

Other articles under this section might be bird tables, window-boxes, etc.

Concrete Work

Concrete has many uses in the garden and on the farm, and a certain amount of useful and instructive work can be carried out by boys. The main difficulty, so far as they are concerned, will be to know the requisite proportions of cement, sand and coarse aggregate to be used for the special work in hand. In this connection it is generally found that a friendly builder or bricklayer is ready and willing to give advice. Some of the many uses to which concrete can be put in a school garden, are—

1. Garden path edgings (*cast in situ*).
2. Slabs either for crazy-paving or for plain paths.
3. Sun-dial pedestals and bird baths. (The mould for these can be constructed by the boys.)
4. Garden frames to take wooden sashes.
5. Foundations and walls for greenhouses.

Science Apparatus

This section falls mainly into three groups—

- I. Meteorological apparatus.
- II. Apparatus for scientific experiments.
- III. Surveying appliances.

I. METEOROLOGICAL APPARATUS

Much of the apparatus necessary for a school meteorological station can be made by the boys. In a later section of this chapter, a very serviceable barometer is described, as well as a wind-vane. Thermometers will have to be purchased, but the wet bulb should be fixed up by the class, being careful to use a thermometer exactly similar to the ordinary dry bulb. It is advisable to cut away the bottom part of the wooden frame of the thermometer, to allow the bulb to be covered easily with linen, to which is attached the wick. A few strands pulled from an ordinary lamp-wick, are very suitable for this purpose.

The thermometer case provides a very good piece of work for a Senior pupil. Two sides at least should be louvred to allow free circulation of air. It is better, however, to have both the door and back, as well as the sides louvred. This case or screen should be on legs to raise it at least five feet from the ground, to remove the thermometers from the influence of ground temperature, and also to allow the records to be taken with greater ease. The door should

face the north, to prevent the sun from shining on the thermometers when the screen is opened.

The rain-gauge can be made quite easily from an ordinary funnel and some sheet tin. The latter is required to make a hollow cylinder which will be let into the ground to protect the collecting vessel. The rain can be collected in any glass jar or bottle sufficiently large. The volume of water collected should be measured in a measuring flask graduated in cubic centimetres. A useful exercise in arithmetic is provided for the older boys in finding out the number of cubic centimetres collected by the funnel which will correspond to one inch of rainfall. A very useful size for the funnel is one which measures approximately 6·2 inches in diameter. On working this out it will be seen that 495 cubic centimetres falling into this funnel represents a fall of one inch of rain. For practical purposes this 495 c.c. can be taken as 500 c.c. It will thus be seen that 5 c.c. represents one-hundredth of an inch of rainfall.

Other interesting handicraft exercises can be devised, in this connection, in the construction of cat-gut and human hair hygoscopes, and a simple anemometer. The cat-gut hyoscope could take the form of what is often called a weather house, or "Jacky and Jenny." The cups on the ends of the anemometer arms could be made from the halves of a copper ball of an ordinary ball-valve. The making of a simple sun-dial is also well within the capabilities of the older boys.

II. APPARATUS FOR EXPERIMENTS

Here again a number of appliances for the study of plant growth and insect life can be constructed.

1. Glass-fronted germination boxes for the study of root systems. A very good model is one with a glass front sloping backwards. A drawing in section of this is shown in Fig. 8.

2. Larvæ breeding cases. A very convenient one has a glass front and perforated zinc back or sides. It has a compartment underneath the main case to hold a small jar of water. By this means small plants or twigs of the plant on which the larvæ normally feed can be kept alive by passing their stems through a hole in the bottom of the upper chamber into the water below.

3. Apparatus for the measurement of plant growth. One such piece of apparatus can consist of a small weight with a piece of fine string or thread attached. This thread is passed over two pulleys fixed to a beam,

and is then attached to the growing tip of the plant. The weight has a vertical scale fixed beside it.

4. Balances to weigh with fair accuracy can be made with tin lids or pans.

These are just a few examples.

III. SURVEYING APPLIANCES

The countryside offers many opportunities for practising simple surveying, and there is practically no surveying instrument, which cannot, in some simple form, be made by boys. Here are a few examples—

1. Ranging rods: alternate feet or links being painted black and white (or red and white).
2. Arrows: wire pegs made somewhat like a metal skewer to mark off each chain as measured.
3. Simple clinometers of various forms.
4. Plane tables and sighting rules.
5. A simple theodolite. The sighting tube can be made from the cylinder of an old bicycle pump or from a piece of sheet tin.
6. Tripods, for both plane table and theodolite, made on the principle of a camera stand.

Dial markings on both clinometer and theodolite can be made either on the wood itself, or by fixing metal protractors. A third method is to make the dials on paper, which should be sized and varnished and then glued to the wood.

Repairs

A great feature of the work in any rural handicraft room should be the repair of anything that does not require the expert knowledge or workmanship of a skilled craftsman. In the school there are many little repair jobs that will give the boys excellent practice in using their ingenuity, and in demonstrating that general handiness which has been mentioned as one of the chief aims of this branch of school work. Not only should school furniture and apparatus be repaired, but the boys might be encouraged to bring work from home. Many pieces of repair work could be made the subject of class discussion, as, very often, a boy will have an idea that has not occurred to the teacher or any other member of the class. Of course, where the garden is an important part of the school, practically all repairs to tools should be carried out in the handicraft room. Any tools broken beyond repair can often be adapted for other purposes, e.g. a broken fork can be bent and made into a Canterbury hoe, broken spades

can be converted into boot scrapers for the garden.

Utilizing Waste Material

Boys, even more than girls, are natural collectors, and wherever possible should be encouraged to collect "junk"—odd pieces of metal, wheels, pieces of discarded machinery, etc., which may be used in place of material which would otherwise have to be bought.

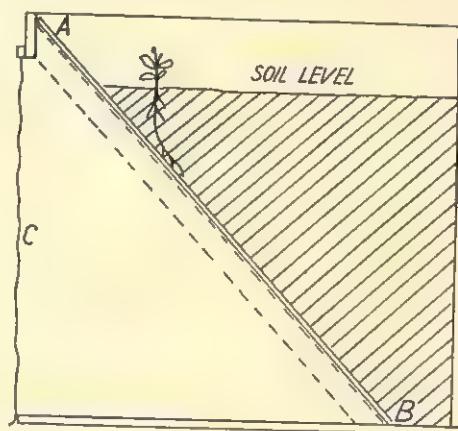


FIG. 8

Germination Box (Cross-section)

AB is a sheet of glass. C is a curtain to exclude light from the roots. The dotted lines indicate battens to support the glass at each end.

The "junk" store will need careful watching to keep out useless material, or it will become an encumbrance and an eyesore. It should have a special cupboard or box allotted to it unless there is a convenient old shed available. To illustrate the use of this apparently useless material, it will be advisable to mention some useful articles made partly, or entirely, from such a store.

A WEATHER VANE

An old bicycle pedal gave a ball-bearing spindle which was fixed into a piece of iron piping (the local garage proprietor "tapping" the necessary thread inside). The shaft of the arrow was made from two pieces of metal bed lath riveted together, and the arrow-head and tail were cut from the sides of an old watering-can, which was past repair.

A BAROMETER

The barometer tubing and mercury had necessarily to be purchased. The framework and base were made from odd pieces of cedar thrown out, when some cedar panelling was being

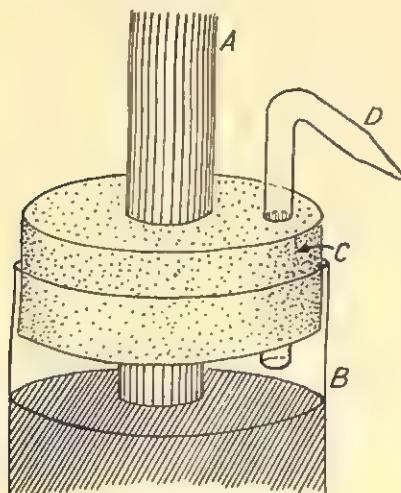


FIG. 9

Utilizing Waste Material : A Barometer

A. Barometer Tubing. C. Cork.
B. Mercury. D. Glass tube to admit air.

carried out locally. The scale and vernier slide were made from odd pieces of brass. The mercury receptacle at the base was a small medicine phial which had been cut down to the required size. To keep out dust and moisture, but to admit air pressure, a cork had to be fitted with a piece of glass tubing, as shown in Fig. 9.

2. A sugar-box made the foundation of a quite serviceable hen-coop.

3. Old cart-wheel spokes have been used for stool legs and ladder staves.

4. Stout boards from packing cases have been utilized in making moulds for concrete work.

5. Disused gas-piping was transformed into supports for wires used to train cordon apple and pear trees, loganberries, raspberries, etc.

With regard to these cordon fruit-trees, the fencing illustrated in Fig. 10 is easy to construct and very efficient in use. As will be seen from the drawing, it needs only three wires, the lower one being 1 ft. to 1 ft. 6 in. above soil level. The wires themselves should be about 2 ft. 6 in. apart. The trees are trained in the required direction by being tied to sticks (bamboo canes, if any are available) or any straight and sturdy sticks which can be cut from big hedge trimmings. As soon as the cordon reaches the middle wire, the stick is moved upwards to carry on the training of the leader; while the tree itself is tied to the lower wire. If the end posts are set in concrete, a strut or straining post is not absolutely necessary for short lengths of fencing. For longer fences the addition of a strut also set in concrete is advisable with an intermediate post if the total length of fencing is over 20 ft. or 30 ft.

Local Industries

Many rural teachers in charge of handicraft will find a great fascination in re-discovering local industries, and even in reviving some of the

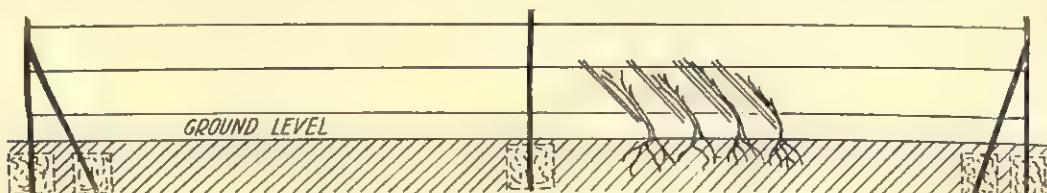


FIG. 10

Fencing for Cordon Fruit Trees

*This shows method of training young trees. Posts and supports are set in concrete.
Scale 1 in. = 10 ft.*

Numbers of other adaptations could be mentioned and will suggest themselves to the keen teacher and pupil. The following are a few which have been used in actual practice—

1. The side of a cheese barrel formed a satisfactory curved bottom for a garden trug or basket.

most worthy of them, before they are entirely lost. Local industries depend so much upon the nature of the locality, its natural products and needs, that it is impossible to pick out any particular ones. An old inhabitant can nearly always be found who will be only too ready and



FIG. 11

A Nature Reserve—where Science and Handicraft can Combine



FIG. 12

A Part of Hertingfordbury School Gardens

This shows, in the background, the Practical Room and Domestic Science Room, a useful type of semi-permanent building which can be erected at a very reasonable cost

pleased to talk of "old times," and to pass on any information to any one sufficiently interested.

Conclusion

In conclusion, it cannot be over-emphasized that the handicraft room is an integral part of the school. It is the school workshop, and all members of the school staff should be encouraged to make full use of the facilities it provides. The boys should be trained to look upon it as a place where they can bring the practical problems

connected with their hobbies, and where they can spend free time when it is too wet, or otherwise unsuitable, to play in the playground. The concern some people feel, with regard to boys being allowed to have free access to a room full of so-called dangerous tools, is far more imaginary than real. This freedom to work in the handicraft room helps to develop habits of self-reliance, and does much to encourage an interest in practical hobbies. It will also be a small contribution towards the solving of that much-discussed problem—training for leisure.



FIG. 13

*Studying the Mechanism of Milk-cooling Apparatus
During a Visit to a Farm*

A DOMESTIC HANDICRAFTS PROJECT

Re-decorating a Room

"**P**LEASE may we do it ourselves?" How many times has that remark been made by eager children, who feel that to re-decorate a room must be "too thrilling for words?"

As a matter of fact, decorating a room can be quite satisfactorily carried out by Senior girls or Senior boys, as shown by the photographs on page 264 in Vol. III of **THE PRACTICAL SENIOR TEACHER**, but it is not quite so "thrilling" for the teacher unless a few important points are considered—

1. It must be remembered that this work requires a good deal of physical energy. Even with care, concentrated stooping and stretching may be necessary, and in any case unaccustomed muscles will be used. For this reason the work should be divided between small teams of pupils for short periods of time, to enable each to have some rest.

2. Only the strongest pupils should be chosen, and a low room is the most suitable for the first attempt.

The responsibility of having a pupil standing on a pair of steps for any length of time should be avoided, especially as so much movement is necessary.

3. If possible, the teacher should not be responsible for any other handicraft during that period. The work is entirely new to the pupils, it is not as simple as it seems, and for their safety requires supervision which cannot easily be given in conjunction with other practical work.

Therefore it is suggested that these subjects be treated as a definite project at some time during the final year, and not taken as a part of any other handicraft course.

Value of the Work

As well as affording a complete change of occupation, valuable work could be done, if preceding the actual practical work, facilities were made for some discussions on such subjects as colour schemes—various effects in decoration which may be obtained by simple means, i.e.—

Making a lofty room look lower.

Heightening the appearance of a low room.

Giving a cold room warmth and a dark room light.

Catalogues and coloured illustrations from magazines prove a great help; they also show the

way in which a beautiful room may be spoilt by overcrowding, introducing the wrong colour, or by furnishings containing too many patterns.

Some of these discussions may result in problems which are beyond the circumstances and conditions in which the pupils are living at the moment. Within certain limitations this should not matter. Everyone should aim high, and a teacher cannot do better than to instil into his or her pupils a desire for comfort and beauty under hygienic conditions.

If the future home-makers can be shown how to obtain these requirements by the simplest and most economical method, they will then have the means to improve the conditions of their adult life.

The value of discussions from another point of view has been fully dealt with in **THE PRACTICAL SENIOR TEACHER**, Vol. I, in the chapter "Practice in the use of spoken English," and Fig. 1 on page 71 shows an example of some of the splendid work which has been carried out with a dual purpose in mind.

After the room is finished quite an interesting short time might be spent in questioning the class upon the different branches of school work which have been brought into use, such as: Arithmetic (e.g. calculation of paper), Science (e.g. insolubility of blue), Cookery (e.g. mixing of powdered ingredients).

It might also be necessary to call upon help from the boys to make some article of wood or metal which would add to the comfort of the room, while members of the art class could easily add to the beauty of a plain wall by some painted or stencilled border.

Children are, unfortunately, apt to put the subjects of the curriculum into separate watertight compartments. As indicated above, a domestic handicrafts project, such as the one outlined here, affords valuable opportunities for providing practical examples of the co-ordination of various branches of the curriculum, which should prove of particular value in the Senior School.

Order of Work

DECORATING WITH DISTEMPER

1. Wash ceiling
2. Wash walls
3. Distemper ceiling
4. Clean paint
5. Paint edges near wall
6. Distemper walls
7. Paint wood

DECORATING WITH WALL-PAPER

1. Wash ceiling
2. Strip walls
3. Distemper ceiling
4. Clean paint
5. Paint wood
6. Paper walls

PREPARATION

With any process of redecorating a room a certain amount of mess is inevitable. With children this will naturally be increased, and therefore care should be taken with preparation.

ROOM. Remove all movable furniture, and any which must remain in the room should be covered with dust sheets or newspaper. Arrangements should be made for some kind of staging, preferably an old table or similar article of furniture, which should be a comfortable height and at the same time firm, as it must be remembered that children are not used to balancing on steps or platforms.

Doors and windows should remain closed throughout each process, but be opened immediately afterwards to increase facilities for drying.

WORKER. A cap and overall which will completely cover the hair and clothing are essential.

Tools

1. **DISTEMPER BRUSH.** 8 in. wide, made of hair or a mixture. This brush may be obtained at varying prices from 8s. 6d. upward, but economy in this direction is not always advisable, as the hairs are easily removed during use. A good brush is suitable for the washing, distempering, and pasting processes, and will last a long time if treated carefully.

Care of Brush. Soak for 24 hours before using. When the work is completed thoroughly remove all distemper from the brush by washing in water. Gently knock the hairs of the brush on the edge of a sink 1 or 2 in. from the handle. Tie a piece of string round the handle and hang downward to dry.

2. **SCRAPER.** 4 in. wide blade can probably be purchased at a second-hand shop for a few pence, or a new one will cost from 1s. to 1s. 8d.

3. **PAINT BRUSHES.** Two at least are necessary, 1 in. and 3 in. respectively. Prices vary; again cheapness is not always an economy.

Care. If they are to be put away dry all the paint must be thoroughly removed with turpentine first. Alternatively, they will keep soft if left in water; before using remove all the water by "painting" on an old piece of board.

4. **BOARD** for mixing plaster of Paris.

5. **BUCKETS OR OLD SAUCEPANS.**

6. **LARGE SCISSORS.**

7. **PAPER-HANGER'S BRUSH.** A good brush (of fine hair) is rather expensive, but a soft clothes-brush may be used as a substitute.

It must be noted that the minimum number of tools are quoted, and where prices are mentioned, they must of necessity only be approximate.

The calculations of paste, distemper, etc., are roughly for a room 12 ft. square.

Preparation of Walls, Ceiling, and Paint

PREVIOUS DECORATION

The careful preparation of the walls before applying the new decoration will largely determine the smartness of the finished work. This stage may not be fully appreciated by the pupils, but must nevertheless be carried out thoroughly.

(a) DISTEMPER

Before fresh distemper is applied, the walls or ceilings should be thoroughly washed to soften the old coat.

The distemper brush can be used for this process, but, if much decorating is to be done, keeping an old one for the purpose will lengthen the life of a new brush.

Wash by frequently dipping the brush into a bucket of cold water and applying on the walls in every direction until a lather is formed. Wash this off and it will be found that the surface of the old distemper has been removed.

Thorough washing not only helps to make a smooth surface, but ensures the removal of all grease and dirt.

(b) WALL-PAPER

Stripping. It is not an infrequent event to find one layer, and in some cases several layers, of old wall-papers which have, to save time, not been removed. This practice cannot be too strongly censured, both from a hygienic point of view, and from that of a really good finish. Therefore the first stage in this case will be the removal of the old paper.

In order that this may be done easily and without damage to the wall, plenty of water must be used, the method adopted being the same as that used for the removal of distemper.

It is most important that the water should be given

time thoroughly to soak into the paper, and the walls may require two or three applications before an edge of the paper can be raised and the paper removed in large strips.

The practice of using less water and removing the paper by scraping with a scraper, or similar instrument, is bad from the point of view both of time and of the danger of chipping the wall.

In order to be certain that all the fragments of paper have been removed, the wall should be washed after stripping.

(c) LIME-WASH

There are cases where walls and ceilings may have been lime-washed.

Distemper may be used to replace it, provided the lime is washed off in the manner previously mentioned for distemper, and solution of clearcole applied first.

CLEARCOLE is prepared by melting 7 lb. jelly size in an old saucepan or bucket with sufficient water to prevent it from burning. When the mixture has become liquid, add about the same quantity of hot water, and sufficient whiting to bind—about 2 lb. (1 ball).

This is applied in a similar way to distemper, the method for which is given later. A coat of clearcole renders the wall or ceiling less porous and should prevent flaking on the application of distemper.

STOPPING DEFECTIVE PLACES

After "washing off" it may be found that there are some cracks or holes, which, if they were not filled, would spoil the finished work.

The next process is filling in the uneven places with plaster of Paris.

METHOD OF MIXING PLASTER OF PARIS

1. Using the proportion of 1 part whiting to 10 parts of plaster of Paris, place the ingredients on an old board and mix thoroughly.

2. Make a hole in the centre and gradually add sufficient water to make a soft paste.

The correct tool for mixing is a small trowel, but a scraper can be used for both mixing and applying if a trowel is not available.

It should be noted that plaster of Paris hardens very quickly; therefore, although the addition of whiting lessens the difficulty, only small quantities should be mixed at a time.

APPLICATION. First wet the whole of the defective part, and apply the stopping, commencing from the edges of the crack and working towards the centre. Allow the plaster to dry thoroughly.

FINAL SURVEY OF WALLS AND CEILING

The class should now make certain that both the walls and ceilings are quite smooth, especially where stopping may have been necessary. A sheet of coarse sandpaper wrapped round a piece of wood will remove all rough places.

The walls are now ready for any method of decoration which may have been chosen, though it should be noted that, if for any reason the walls to be treated are hot, a preliminary coating of size will prevent suction, and thus ensure a more even application of distemper.

Again, if wall-paper is to be used a coat of size will give the walls a glazed surface which will assist in placing the paper easily into position.

PREPARATION OF PAINT-WORK

Whether an entire new colour scheme is to be introduced or just a general re-decoration, there is usually some paint-work which requires attention.

Here, again, thorough cleaning is necessary to remove all grease and dirt; otherwise new paint will not dry easily or give an even finish.

An old distemper brush is the most suitable, or failing that a soft scrubbing brush. Wash well with a solution of weak soda water, and rinse thoroughly with clean water, otherwise the paint will not dry, owing to the soda.

Any rough places can be rubbed with sandpaper as previously mentioned for walls.

Distempering

HOME-MADE DISTEMPER

- Break up 8 lb. whiting into a bucket and well cover with cold water. Allow it to stand for several hours.

- In an old saucepan slowly melt 4 lb. jelly size with sufficient water to prevent it from burning. Stir occasionally.

- Break to a powder one packet of Reckitt's Blue. (If other makes of blue are used, a piece the size of a walnut will be sufficient guide.)

- Mix the powder with water, taking care that no grains are left whole.

- Pour off the water from the whiting.

- Beat the blue into the whiting, taking care that no spots are left, as blue is not soluble. The distemper would not be a good colour without adding blue; and while the mixture at this stage will look very bright, it must be remembered that distemper dries several shades lighter.

- Gradually add the melted size to the blued whiting, stirring well with a stick.

- Allow this mixture to stand for a short time, when it will jellify. Sufficient water may be added before using to form a thick cream, and more may be added during the application should the mixture become too thick.

TINTING DISTEMPER

The addition of colouring matter to a home-made distemper for application to walls is not a

simple matter for the amateur. Ready-mixed distempers of all shades, with colour sheet from which to choose, can so easily be purchased at comparatively little extra expense, that it seems hardly worth the trouble entailed.

However, by those who wish to make their own, such colouring powders as yellow and red ochre, umber, venetian red, and ultramarine blue can be bought and added to the distemper.

In order to obtain the correct shade, the colour or combination of colours should be mixed carefully with a little water and beaten into the distemper. A little should be brushed on a piece of paper and allowed to dry, to test the colour.

WASHABLE DISTEMPERS

When using these distempers, such as Hall's and Duresco, it is important to follow the instructions given by the makers, and only a special solution should be used for diluting if the mixture becomes too thick. They can be purchased at a specified tint, and colours may be blended, provided they are both made by the same maker.

APPLICATION OF DISTEMPER

IMPORTANT POINTS

1. Distemper dries rapidly.
2. Distemper cannot be touched-up afterwards.
3. All splashes on the floor should be washed off after each side of the wall is completed, as distemper is difficult to remove when thoroughly dry.

Method. Work from angle to angle of the room. Dip the distemper brush into the mixture half-way up the bristles, and remove the surplus mixture by dabbing the tip of the hairs only against the bucket.

Turn the brush up quickly and ply the brush in any direction, but the final movement must be upward from floor to ceiling.

Owing to the rapidity with which the distemper dries, only small areas should be done at a time. This method ensures that one edge of the distemper remains wet and thus prevents brush marks from showing—in other words, "keeping the edge alive."

STIPPLING

A mottled appearance may be given to the

walls by the application of a stippling brush on the second coat of distemper while it is still wet.

This obviates such great care in the application of the distemper, as stippling removes all brush marks, but the brush for this purpose is made of the finest hair, and the cheapest is about 15s.

The process is carried out, after a small space has been distempered, by dabbing the stippler lightly but evenly over the surface.

A second coat of distemper should be avoided unless a stippler is to be used.

Wall-papering

CHOICE OF PAPER

Here the choice of paper will greatly add to or lessen the difficulties of the teacher embarking on this enterprise for the first time, and it would be advisable to choose a paper without a pattern.

A paper with a pattern may be of two kinds, "set" or "dropped." In the first case the pattern is exactly the same on each line. Therefore, supposing 10 lengths of paper were required, these could be measured and cut off without any fear of their not matching when placed side by side on the wall.

On the other hand, with a "dropped" pattern not only must the pattern be carefully matched before cutting, but it must be continuous round the room, even when doors and windows intervene.

QUANTITIES

FIRST METHOD. The average English paper is 21 in. wide and contains 12 yd. in a "roll" or "piece."

Foreign papers are frequently only 18 in. wide, and the roll may consist of only 10 yd.

There are several methods of calculating the quantity required; but taking the average room as 10 ft. high, 3 lengths can be obtained from one roll, with some to spare for the extra parts, such as above the door.

SECOND METHOD. Measure the height and breadth of the room, which will give an answer in square feet; divide by 9 and reduce to square yards. The content of a roll of paper is 21 in. by 12 yd., which is 7 sq. yd. Divide the area of

the walls by 7 and the answer is the number of rolls required. The space taken by doors and windows, etc., must, of course, be deducted from the area before dividing by 7.

MAKING THE PASTE

Put 2 lb. flour into a bucket and gradually add sufficient cold water to make a smooth paste. Pour on about 1 gall. of boiling water, stirring all the time.

When this water is added, the paste will thicken and become a jelly; but unless it is carefully mixed throughout the process, it will become lumpy.

For those who have easy access to a builder's merchant, paste is not worth making, as it can be bought for a few pence.

CUTTING THE PAPER

A large table is best for this purpose, so that the lengths may be carefully measured, allowing 3 in. top and bottom, which is removed after the paper is hung. If necessary, carefully cut away the margin each side of the paper, but if possible buy the rolls with the white margins cut off: the charge varies between $\frac{1}{2}$ d.-2d. a roll.

PASTING THE PAPER

If a brush is purchased for this purpose only, a cheap one is quite satisfactory, otherwise the distemper brush may be used without injury.

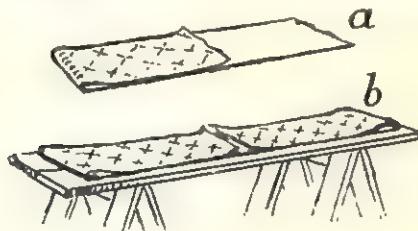


FIG. 1

Pasted Wall-paper Folded Over

Place the lengths of paper one above the other with the top one slightly nearer the worker. Paste from the centre to the edge farthest away, and then draw the paper to the edge of the table, and finish from the centre to the edge nearest to the worker. This method should prevent any paste from getting to the front of the paper. Where space is confined, paste one end and fold up, pasted sides together (Fig. 1).

HANGING THE PAPER

[In using plain papers, work with three rolls, taking a strip from each consecutively. This minimizes the slight variations in printing which are apt to be found, through rolls having been printed at different times.]

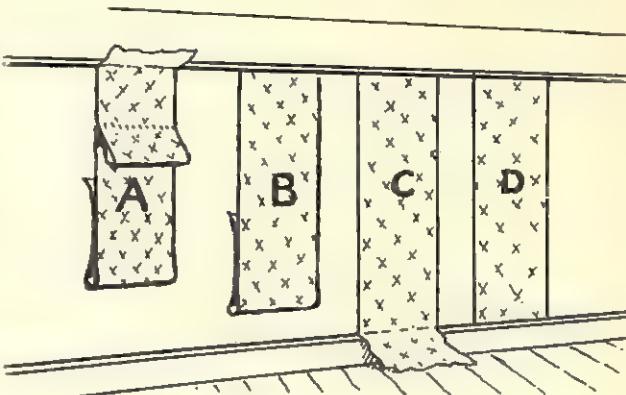


FIG. 2

The Four Stages in Hanging a Strip of Wall-paper

Usually the window is sufficient guide for hanging the first length correctly, but a plumb bob or string and weight may be used if preferred.

In any case it is usual to commence in the lightest part of the room and work to the darkest, i.e. from each side of the window, to minimize the likelihood of the joins being very apparent.

In order to transfer the paper from the table, it is most convenient to double it in half, taking the top and bottom to the centre respectively, with the paste inside. If there is any difficulty after that owing to length, one end must be again folded like a screen.

Place the paper flush with the window, leaving 3 in. of paper to spare at the top.

Gradually flatten the paper against the wall, with the paper-hanger's brush (Tool 7). The extra pieces are cut off from the top and bottom, after the paper is in position (Fig. 2).

The second piece is placed by the side of the first, with the two edges quite flush. These sometimes have to be flattened with a brass roller or bed castor in order that they may be less noticeable.

It is not advisable to carry a wide strip round a corner from one wall to another; nor must a

THE PRACTICAL SENIOR TEACHER

join be made right in the corner. As an angle is approached, measure off the exact width to the corner plus $\frac{3}{4}$ in.—1 in. This should be marked down the length of the strip and carefully cut off. The extra inch will be brought round the corner, and the strip which has been cut off will be used next, to continue the pattern.

*Finish off Paint sharp
to the Joints*

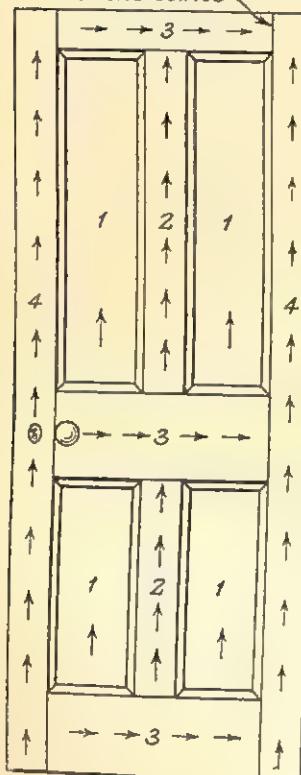


FIG. 3

Painting a Door

Numbers indicate order of painting; arrows show the direction of brush movements.

If it is necessary to use a plumb bob, the top of the string should be tied to a nail tapped into the wall at the starting point. When the first strip is fixed in place, the edge should lie flush with the string of the plumb bob.

Painting

There are many brands of paint, and, although home-made kinds may be cheaper, the work is not easy and is inadvisable for amateurs.

It is essential that the paint-work should be quite dry before applying new paint.

If the paint-work is in good condition, one coat of new paint may be sufficient, but frequently a second coat is necessary.

MIXING

Assuming that white lead paints are being used, the following methods should be followed:

One Coat of Paint Only. Thin down the paint with a mixture of linseed oil and turpentine.
Two Coats of Paint—

1st. Coat. Thin down with turpentine; this will make the paint harden quickly, but take away some of the gloss.

2nd. Coat. Thin down with linseed oil. The first coat should be thinner than the second.

Paints other than those made from white lead, such as dark browns and greens, should be thinned with boiled linseed oil, which can be purchased at the same time as the paint.

Picture rails, window sashes, and doors should be done first, and the skirting boards last, except in the case of edges which touch a wall—these should be painted before distempering or paper-hanging. In any case mix sufficient paint to finish the room.

Care should be taken not to get paint on the glass of windows or the floor; should this happen, spots must be removed at once. A small piece of linoleum placed on the floor in front of the skirting board as it is painted will protect the floor, and prevent any dirt from getting on to the brush.

To obtain a smart finish, a door should be painted in the order shown in Fig. 3.

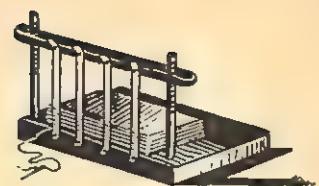
Important Points—

1. The paint must be well mixed and stirred down to the bottom, using a stick, not the brush.
2. Only the tip of the brush should be put into the paint, and the surplus should be squeezed off on the side of the tin.
3. The brush may be applied in any way, but the final stroke must be finished in the longest direction, i.e. sideways for skirting, upward for the side of a door and windows.
4. Care must be taken not to leave any brush marks.
5. No advantage is gained by using paint to excess; it may not harden properly, and takes a longer time to dry.
6. One coat should be allowed to dry thoroughly before a second is applied.

For a room containing two doors, window, and skirting, about 7 lb. paint would be required.



BOOKBINDING



THESE exercises in Binding Crafts form part of a graduated scheme which ends in the making and binding of books, and, though the preliminary work is not a definite craft itself, it leads up to a craft. One of the foremost aims of the school is to foster and encourage the love of books; not only their contents, but also their appearance and structure. (See the Frontispiece of this volume.)

These suggestions are an effort to interpret the Board of Education's Suggestions and other recommendations made from time to time by other recognized educational bodies.

Through handwork the child acquires a certain attitude of mind which can be developed in no other way. In all branches of this subject, the success of a scheme will depend upon its usefulness.

The value of careful daily preparation need not be emphasized here. It is no less important in this than in any other subject. In fact the success achieved depends very largely upon the preparation of each lesson. Before attempting to teach an exercise, the teacher should have made it. The making and study of an exercise should reveal to the teacher what process in a given problem needs special care and attention.

The teacher should always try to lead the pupil to improve upon the first attempt. It is clearly wrong to restrict a pupil entirely to imitative exercises. In the early stages there is need for some definite guidance and training, but when the rudiments have been mastered the child should be given scope to develop ideas.

To overcome the difficulties of a large class it is advisable to "sectionize." With a normal class six sections are suggested. Promotions should be made from time to time from one section to another. The varying abilities of the children are thus allowed for and the slow worker is not unduly discouraged.

Types of Cases

It will be advisable for the teacher to be familiar with the various types of cases which

are recommended. For obvious reasons no measurements are given. The type for a particular exercise will depend upon the purpose for which the book is required. The amount of hinge space will be determined by the number of pages the book is to accommodate.

The simplest form of back is made from one piece of thin card. Score with a blunt tool along *AA* (Fig. 1). Cut a piece of covering paper 1 in. wider and longer than the piece of card. First fold over the four corners (Fig. 1), then the remaining strips. This prevents a "gaping" mitre and also strengthens the corners. This simple form of back may be further strengthened by means of a strip of binding cloth around the back fold either before or after applying the covering paper. Line with brown paper, leaving $\frac{1}{8}$ in. margin all round.

TYPE A. Cut two pieces of card, and a strip of binding cloth sufficient to reach round the back fold, plus 1 in. for overlap (Fig. 2). The covering and lining papers are each cut in 2 pieces (see instructions for types of binding). Punch two holes through the back of the cover. Punch the pages (similar gauge) and cut a strip of thin card to protect the top page (Fig. 2a).

For this type of back the pages may be secured in one of the following ways—

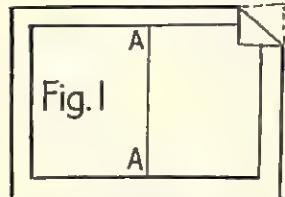
1. Tie by means of a lace.
2. Use round elastic, fitted with "sheath and spear" tags.
3. Use ordinary binding fasteners.
4. Ordinary collar studs with detachable heads (these work very satisfactorily).
5. By means of loose-leaf rings (Fig. 2b).

Figs. 2c, 2d, 2e, 2f show different methods of lacing the pages to the binding cases. Fig. 2g shows short cords fitted with tags for use with Case Type A.

TYPE B. This type of binding case will be found to be suitable for a considerable number of exercises.

Set out as explained in Fig. 3. The binding strip placed around the back should overlap the cards *A* and *B* about $\frac{1}{4}$ in. Complete the cover as before (either half or quarter binding). The

TYPES OF CASES



Simplest form of Case.

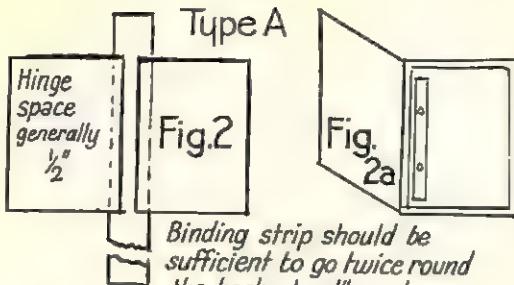


Fig. 2

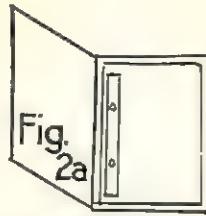


Fig. 2a

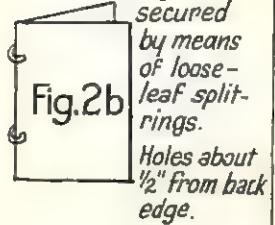


Fig. 2b

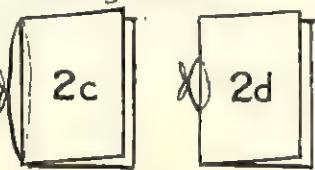


Fig. 2c

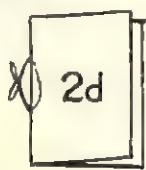


Fig. 2d

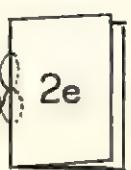


Fig. 2e

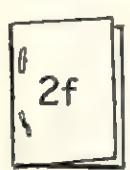


Fig. 2f

Short cord and tags for use with this case.
2g

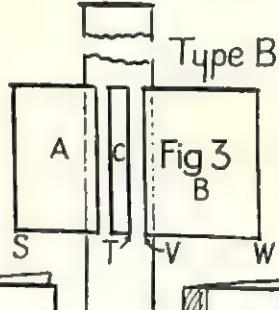


Fig. 3

B

A

C

D

S

T

V

W

Fig. 3

B

A

C

D

S

T

V

W

Binding Screws



Nut Screws
are recommended for many types of backs

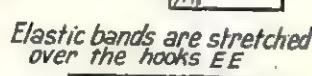


Fig. 3a



Fig. 3b



Fig. 3c



Fig. 3e

Type C

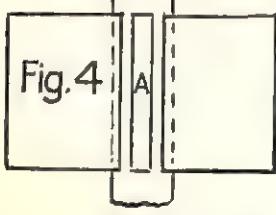


Fig. 4

A

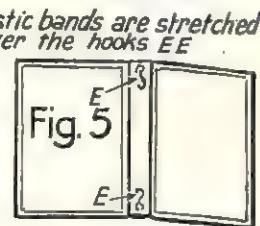


Fig. 5

E

E

Elastic bands are stretched over the hooks EE.

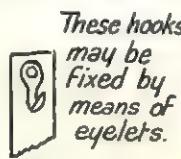


Fig. 5a



Fig. 6

Twin split-ring attachment

Type D

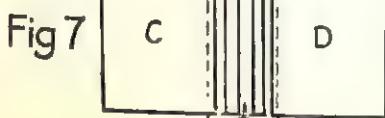


Fig. 7

C

D

A

A

B

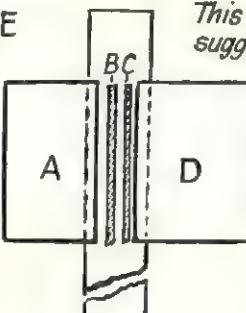
This case is suitable for Album types.

Fig. 8b

If nut screws are used, do not fit eyelets.



Type E



This case is suggested for large books of the Album type

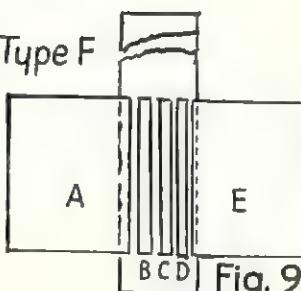
Fig. 8



The contents may be printed on the rigid back.

Fig. 8a

Type F



A

E

BCD

Figs. 1-9

Hinged Cases

hinge space between *A* and *C* should be $\frac{1}{2}$ in., but the space between *C* and *B* will depend upon the capacity of the book. The distance *ST* = *VW*.

Suggested methods for holding the pages—

If the book is small, punch 2 holes, fix eyelets and tie together with a lace (Fig. 3a). Larger books may have three or four punch holes (Figs. 3b, 3c).

Nat screws are recommended for this type of case; being telescopic they allow for a fair margin of increase in the thickness of the book (Figs. 3d, 3e).

TYPE C. This type is designed for those cases

that both the front and back covers are hinged. Four pieces of card are required, the hinge strips being 1 in. wide. The hinge spaces at *AA* are each $\frac{1}{2}$ in. The width of *B* will depend upon the capacity of the book. Cards *C* and *D* are equal in size. Pages may be held by means of a lace or by any of the methods already explained. This case is suitable for "Album" types (Fig. 7).

TYPE E. Hinged front cover—rigid back. Four pieces of card are required. *A* and *B* form the front cover, *C* the rigid, and *D* the back cover (Fig. 8). Figs. 8a–8c show how pages are secured.

TYPE F. Hinged back and front covers and rigid back. For this case five pieces of card are

TYPE G

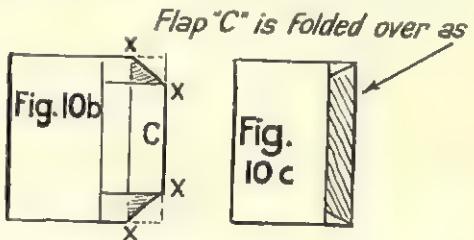
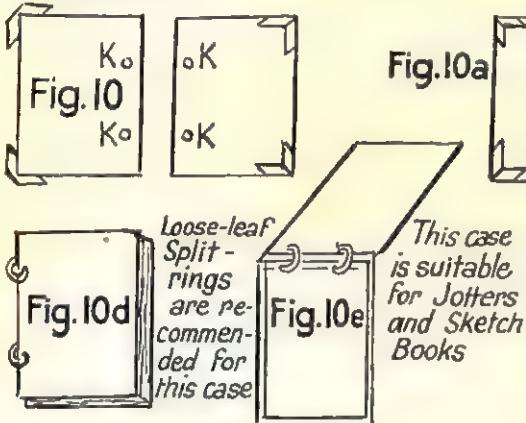


FIG. 10
Case Type G

which are required with a rigid back. The back strip *A* may be from $\frac{1}{2}$ in. to 1 in. according to requirements. Make up the case as before, leaving $\frac{1}{2}$ in. spaces between *A* and the front and back card pieces (Fig. 4).

Fix eyelets at *EE* and thread through these a piece of circular elastic, the loop being on the inside (Fig. 5). A number of folio pages may be placed underneath the elastic.

An alternative method is to fix hooks by means of eyelets; elastic bands may then be stretched over these (Figs. 5 and 5a).

This type of binding case is also useful for storing small pamphlets, Best Way Books, etc. Twin split ring attachments are now obtainable for fitting to this type of back. They may be fastened by means of two small bifurcated rivets (Fig. 6).

TYPE D. This case is similar to type B except

required. *A* and *B* form the front cover, and *D* and *E* the back cover. The card pieces *A* and *E* are of equal size (Fig. 9).

TYPE G. Two loose covers—no hinge. In this exercise the two parts of the cover are made separately. If the book is designed for hard wear it is suggested that linen corners be fitted (Fig. 10). A linen strip along the back edge will also strengthen the book. The parts marked *A* and *B* are first folded over (Fig. 10a). The corners are now cut away (indicated by means of line *xx*, Fig. 10b). The top part of the binding cloth (shaded) is now cut away and the part *C* is pasted over (Fig. 10c). For this case, loose-leaf split rings are recommended (Figs. 10d, 10e). If tags or laces are used, fit eyelets at *KKKK*, Fig. 10.

A book of this type makes an excellent jotter notebook or sketch book.

Types of Backs

LIMP BACK

The most simple kind of back is the "one-piece" limp cover, which may be made from thick pastel paper or thin manila card.

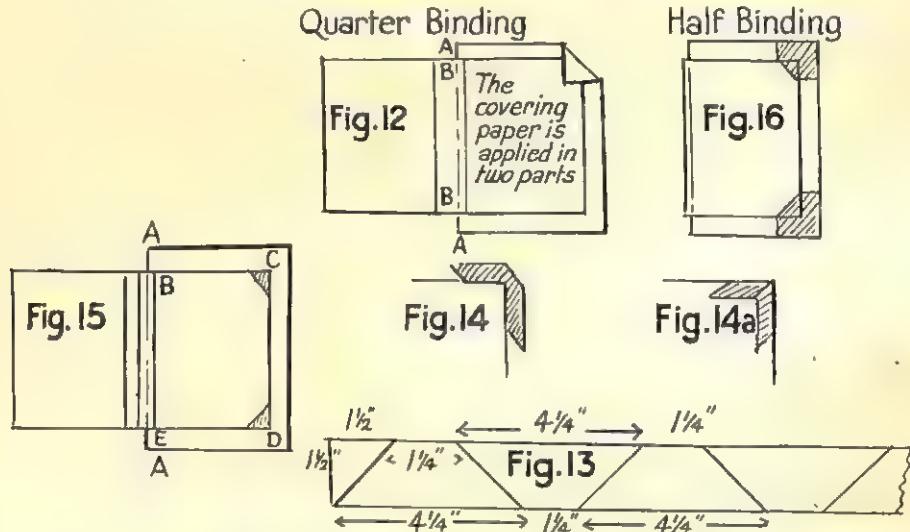
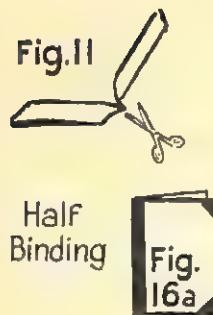
A more durable book may be made by cutting a piece of binding cloth the required size and pasting this to a sheet of strong brown paper. The paper may be trimmed off afterwards, cutting flush with the edges of the binding cloth. In all cases the cover should be about $\frac{1}{2}$ in.

margin $\frac{1}{2}$ in. all round. The back should be folded (folio form) before the paste has dried.

TWO-PIECE BACK—QUARTER BINDING

Cut the pieces of card of the required size, also a strip of binding cloth sufficient to reach all round the back plus an overlap of 1 in. The width of the strip and the distance apart of the cards will depend upon the thickness of the book. Generally a strip 2 in. to $2\frac{1}{2}$ in. wide is sufficient.

The covering paper in this case must be applied in two parts, each being about 1 in.



Figs. 11-16a

Types of Backs

broader and longer than the book itself. This will leave $\frac{1}{4}$ in. margin all round.

ONE-PIECE COVER

Cut a piece of thin card $\frac{1}{2}$ in. longer and broader than the book folio (opened out). Select suitable covering paper and cut a piece 2 in. longer and broader than the thin card. Apply paste "all over" the covering paper and place the card in position, leaving an even margin all round. Fold over the edges and pinch up the corners. Cut off the spare parts of the corners, holding scissors obliquely (Fig. 11).

An alternative method is to paste over the corners first, then the edges. If the cover paper is very thick the former method should be adopted. Line with brown paper, leaving a

wider and $1\frac{1}{2}$ in. longer than the card piece. The edge AA should reach to within $\frac{1}{2}$ in. of the edge of the card BB (Fig. 12). The covering paper is now folded over as explained in the making of one-piece cover. Lining paper is now applied to each half.

HALF-BINDING

Half-binding is recommended if the book is likely to have much wear.

Join two card pieces together, using a linen strip as explained in quarter-binding.

From binding cloth cut four pieces as illustrated in Fig. 13. Apply the corner pieces as explained in Fig. 14. Fold over the edges on the inside and the corner piece will appear as in Fig. 14a.

Take a piece of covering paper and place underneath the card back so that the edge *AA* overlaps the linen binding by about $\frac{1}{4}$ in. (Fig. 15). Mark round *BCDE* with a pencil and remove the card. Measure distances of $1\frac{1}{2}$ in. from the corners *C* and *D* and draw the lines as shown (Fig. 16). The shaded parts are now cut away. Use this cover as a templet and cut the other half of the covering paper.

Paste the covering papers and apply to the card backs. Fold over the overlap and line with self-coloured paper, leaving a margin of $\frac{1}{8}$ in.

Portfolios and Holdalls

The making of portfolios, holdalls, and files offers a wide range of suggestions for the permanent protection of work and illustrations of various kinds.

Throughout all stages of school life the child should be taught the value of method and orderliness in all branches of school work.

Portfolios for the storage of small pamphlets, weekly parts, illustrations for the geography, history, and nature study lessons, maps, paintings, drawings, records, etc., should be part of the equipment of any well-conducted Senior School.

These may be used in two ways, either individually for the pupils' own use, or communally for general class use.

The best results will be obtained if the teacher of handwork collaborates with his colleagues. In this way the needs of a class and school will be ascertained.

During the first year of the Senior Course, it will be advisable to carry out various preliminary exercises, using thick manila board instead of cardboard. If the scholars have had little practice in bookcrafts in the Junior School, the making of these exercises will give the necessary training in creasing, folding, turning in the edges, and rubbing down.

When the children have bestowed much care and time upon the preparation of diagrams, etc., they will naturally wish to preserve them as long as possible.

Figs. 17, 18, 19, 20, 21 show typical exercises ; manilla board is used, with bookbinding cloth for the hinges.

To obtain Fig. 19, fold over the card along the lines indicated in Fig. 19a.

Fig. 19b shows the development of the side hinge, which is affixed to the edges *xx* and *yy* (Fig. 19).

Figs. 20a, 20b, 20c, 20d show the parts necessary to make the holdall indicated in Fig. 20.

The development of the portfolio, Fig. 21, is shown in Fig. 21a.

Fig. 22 is designed to hold leaflets of the size issued by the Empire Marketing Board.

The binding strips should be 1 in. longer than twice the length of the binding case.

Eyelets may be fixed at *xx*, and through these lace fine circular elastic, so that the loops are on the inside. When a sufficient number of folds have been made, tie the ends, being very careful to see that the elastic is moderately tight. The pamphlets are placed under the elastic strands.

As an alternative, ordinary elastic bands may be placed round hooks by eyelets (Fig. 22a).

"POCKET" PORTFOLIOS

For these exercises use Type A case, each card piece being $8\frac{1}{2}$ in. \times $10\frac{1}{2}$ in., and the binding strip 3 in. \times 22 in. Make the case, leaving a hinge space of 1 in.; put on the covering paper either quarter- or half-binding, but do not at this stage line the inside. Punch four holes (marked *X*) 2 in. from the top and bottom and $\frac{1}{2}$ in. from the side edges (Fig. 23b).

Before inserting the eyelets place a piece of cord or tape (6 in. long) through each hole.

When the eyelets are opened out it will be found that the cords or tapes are securely fixed.

Figs. 23a, 23b, 23c show alternative methods of making the retaining flaps or pockets.

CLIP PORTFOLIO

Make a simple binding case (Type A), each piece being 9 in. \times 14 in. Leave a hinge space of $\frac{3}{4}$ in. Before applying the covering paper, fix a steel spring clip (Fig. 24b) through the back cover by cutting a slip (*xx*) of sufficient length to accommodate the spring (Fig. 24). The lower part of the clip *AA* is on the outside of the cover (Fig. 24a). Paste a rectangular piece of strong brown paper over this arm, then apply the covering paper.

PRELIMINARY HOLDALL EXERCISES



Fig. 17

These holdalls may be made from strong manilla paper.

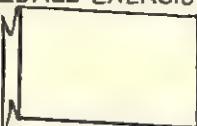
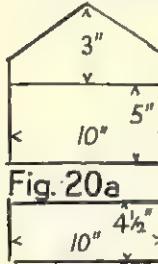
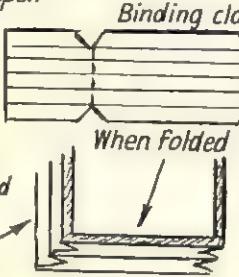


Fig. 18



These card pieces are attached to the hinge.

Fig. 20b



When Folded

Fig. 20d

Fig. 20c



Completed as

Hinge made from Binding Cloth.



When Folded assumes this form

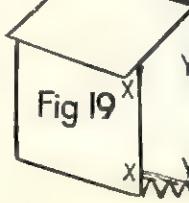


Fig. 19

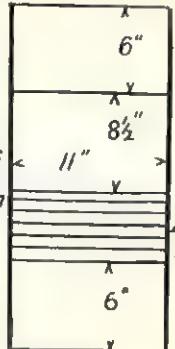


Fig. 19a

Made from manilla card

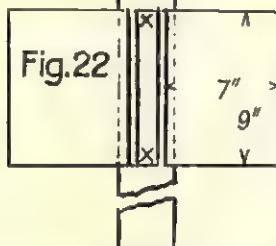
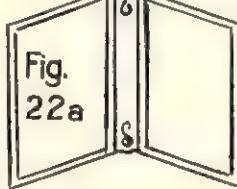


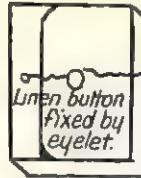
Fig. 22

The hooks are fixed by means of eyelets.



S

Fig. 21



Alternative method of fixing tapes.

The portfolio is secured by giving a double turn of the cord round the linen button.

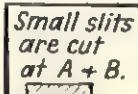
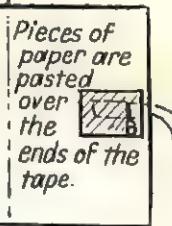
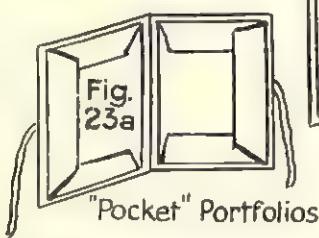


Fig. 21a

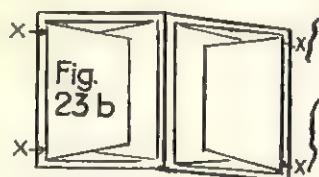


Pieces of paper are pasted over the ends of the tape.

Fig. 23



"Pocket" Portfolios



Alternative methods of making retaining pockets.

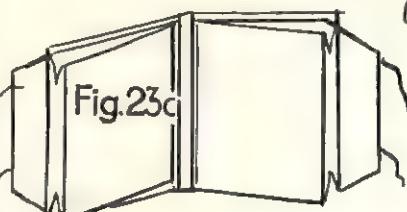


Fig. 24a



The arm AA is passed through the slit XX



Fig. 24b

Cyclist's trouser-clips may also be used.

Clip Portfolio

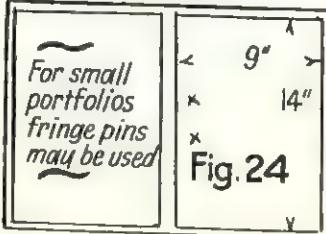


Fig. 24

For small portfolios fringe pins may be used

Figs. 17-24b

Portfolios and Holdalls

EXPANDING FILE

Fairly strong card should be used for this exercise. Cut out three pieces as follows—

Two pieces 16 in. \times 10 in.

One piece 16 in. \times 3 in.

Make up the case Type C and fit linen corners. Leave hinge spaces of $\frac{3}{8}$ in. Cover with suitable paper (half-binding: Fig. 25).

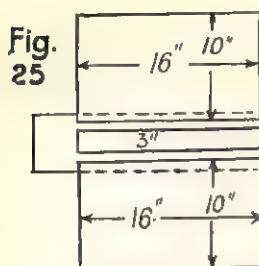


Fig.
25

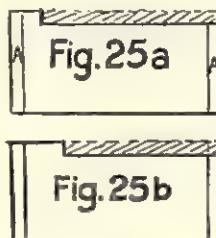


Fig. 25a



Fig. 25b

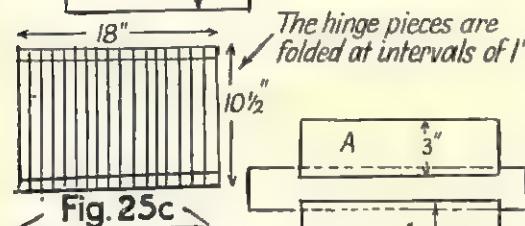


Fig. 25c

This shows the method of attaching the card divisions

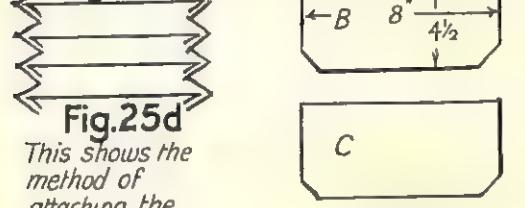


Fig. 25d

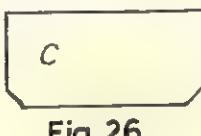


Fig. 26

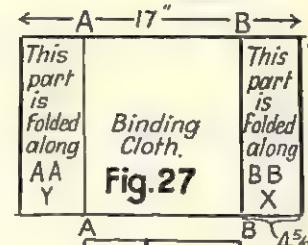


Fig. 27

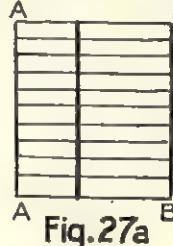


Fig. 27a

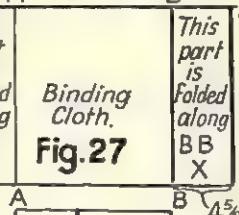


Fig. 28

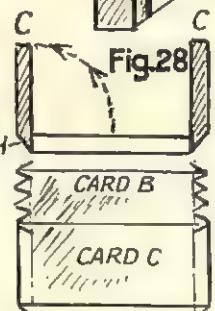


Fig. 29

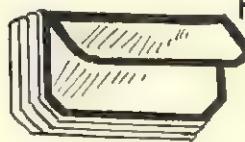


Fig. 30

EXPANDING FILE

the binding cloth from tearing when the file is in use. Now fold over fanwise at intervals of 1 in.

The strips marked A (Fig. 25a) are now pasted and applied to the zigzag hinge, as indicated in Fig. 25d. When all the card pieces have been fixed in position, the hinge strips should be pasted to the back card pieces, then the whole

EXPANDING FILE

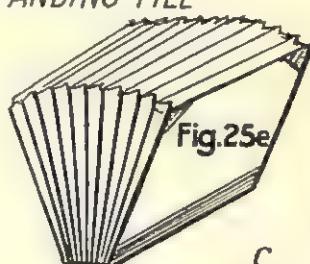


Fig. 25e

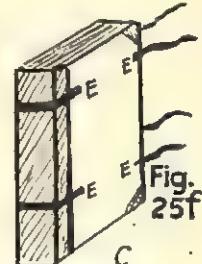


Fig. 25f

Figs. 25-30

Expanding Files

Cut a number of pieces (say twelve or sixteen) of thin card, size 17 in. \times 10 in., and fold over strips along both sides $\frac{1}{2}$ in. wide. Score with a blunt tool before bending (Fig. 25a).

It will facilitate filing arrangements if these cards are indented. If sixteen cards are provided the first card may be cut away as indicated in Fig. 25a. The second card will be cut as Fig. 25b, each strip to be cut away being 1 in. shorter than the preceding one.

For the hinges use bookbinding cloth. Take a piece 18 in. \times 10 $\frac{1}{2}$ in. Fold over a strip $\frac{1}{2}$ in. wide as indicated (Fig. 25c). This will prevent

is affixed to the binding case already made (Fig. 25e).

For the cover make another binding case, using the same dimensions as before. Cut small slits at E and thread through these pieces of strong tape. The file is placed in the cover as indicated in Fig. 25f. Instead of tape, leather strips fitted with press studs may be used.

DEVELOPMENT OF THE EXPANDING FILE

Cut out three pieces of card—two 8 in. \times 4 $\frac{1}{2}$ in., and one 8 in. \times 3 in. (Fig. 26).

Pieces A and B should be joined together

THE PRACTICAL SENIOR TEACHER

by a piece of binding cloth 5 in. \times 17 in. (Fig. 26).

Do not at this stage join together pieces *B* and *C*.

Take a piece of binding cloth or strong brown paper 10 in. \times 17 in. Fold over the part *X* along line *BB*, and the part *Y* along line *AA* (Fig. 27). The rectangular piece *ABBA* is now folded over backward and forward from *AB* at intervals of 1 in. (Fig. 27a). Carefully pull out the folds *CC* until they assume a right-angle position (Fig. 28). The corner *H* will now assume the shape as shown in Fig. 28. Deal similarly with the other side. Mitre the lower corners of the cards *B* and *C* as shown in Fig. 26. Before attaching the card *C* cut off the top fold (shaded: Fig. 28). Cards *B* and *C* are placed as indicated in Fig. 29.

Covering paper is pasted on the outside, a $\frac{1}{4}$ in. margin being left all round the edges (Fig. 30).

A handy school file may be made in this way, the sizes of card suggested for this exercise being two pieces 12 in. \times 8 in. and one piece 12 in. \times 4 in.

The pieces of brown paper or bookbinding cloth for the hinge should be sufficiently long so that twenty-six pockets may be made. It is suggested that the folds be each $\frac{3}{4}$ in. (Twenty-six pockets will require fifty-two folds.) Thin card partitions may be placed as in the expanding file, and these may be indented and lettered alphabetically.

Loose-Leaf Class Books

LOOSE-LEAF BOOK FOR HISTORY OR GEOGRAPHY NOTES

Construct a binding case (Type A) the size of each card being 7 in. \times 9 in. The strip of binding around the back should be 19 in. \times 2 $\frac{1}{2}$ in., the width of the hinge being $\frac{3}{4}$ in. (Fig. 31).

Linen corners (quarter-binding) will add much to the "life" of the book. Punch two holes 2 $\frac{1}{2}$ in. from top and bottom of the book and $\frac{3}{4}$ in. from the inner edge of the card; this leaves a 4 in. gauge between the holes on the page (Fig. 32). Insert eyelets in the holes. Cut the necessary pages 6 $\frac{1}{2}$ in. \times 8 in.

METHODS OF SECURING THE PAGES

1. Use an ordinary boot lace or a piece of tape.

2. An elastic cord fitted with sheath and spear tags.

3. Binding fasteners with washers.

The top page should be protected by a card strip 6 in. \times $\frac{1}{2}$ in. This may be used as a gauge when punching the pages (Fig. 32).

A SECTIONAL LOOSE-LEAF BOOK

Make a binding case as in the former exercise. Cut several pieces of thin card (according to the number of sections required) 7 in. \times 8 $\frac{1}{2}$ in.

If four sections are required, indent the cards as in Fig. 33, *A*, *B*, *C*, *D*.

The card tags may be coloured with water-colours, or different coloured strips may be pasted on. Assemble the book allowing 12 or more pages per section.

Fig. 34 shows the finished book.

LOOSE-LEAF EXERCISE BOOK

Continuous elastic and split perforation.

Make two back covers as suggested in Type G, with the addition of a hinge to the front and back covers. The card pieces required are two 8 in. \times 1 in. and two 8 in. \times 5 $\frac{1}{2}$ in. $\frac{1}{4}$ in. will be sufficient for the hinge (Figs. 35 and 36).

Punch holes in the top part of the cover as indicated in Fig. 36.

The middle hole, *A*, should be small in diameter. The holes *B* and *C* should be fitted with eyelets.

Punch two holes (those corresponding to *B* and *C*) in the back cover. Lace fairly strong elastic through the holes as indicated in Fig. 37.

Tie the two ends in a double knot at *D*.

Cut a number of pages, 6 $\frac{1}{2}$ in. \times 7 $\frac{3}{4}$ in., and mark the positions of the holes according to those on the back cover. Punch a large hole in the centre *A*; this is to accommodate the knot. With a sharp knife cut between the holes *B* and *C* and the edge of the pages (see Fig. 38).

Place the pages in position on the inside cover; turn over the front cover, being careful to see that the elastic passes through the slits at *B* and *C* (Fig. 38).

Stretch the loop at the back of the book so that it reaches round the front hinge of the

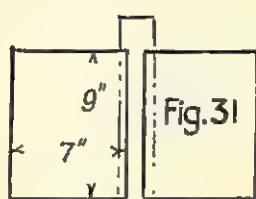


Fig. 31

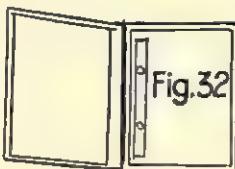


Fig. 32

The binding strip is 19" x 2½"

Leave a hinge space of ¾"



Fig. 34

History or Geography Note Book

It is advisable to have a common gauge between the holes for all books.

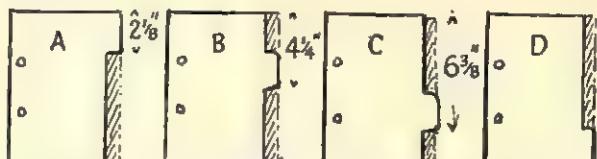


Fig. 33

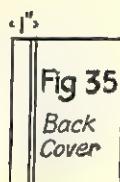


Fig. 35

Back Cover

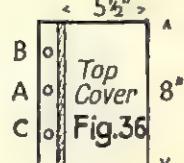


Fig. 36

Top Cover

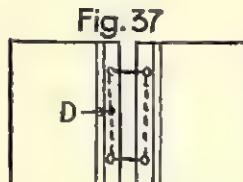
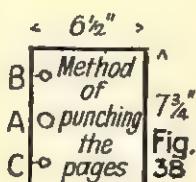


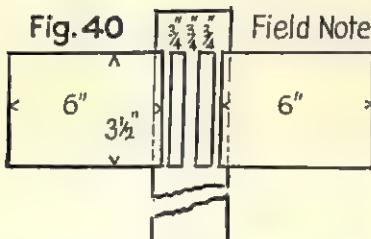
Fig. 37

Inside view of the covers. The elastic ends are tied in a knot at D



B → Method of punching the pages
A → Fig. 38
C →

Fig. 40



Field Note Book

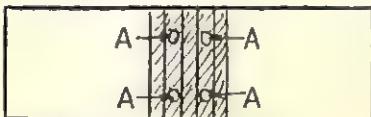


Fig. 41

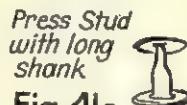


Fig. 41a



Fig. 39

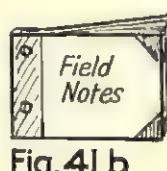


Fig. 41 b

Note Book Inverted back fold.

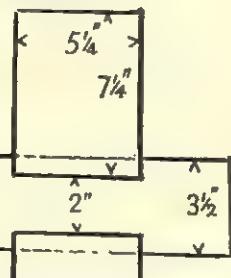


Fig. 42

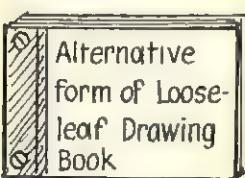


Fig. 46

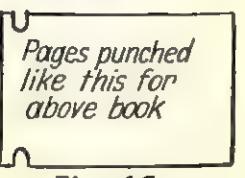


Fig. 46a

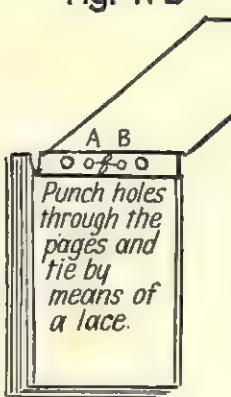


Fig. 45

Punch holes through the pages and tie by means of a lace.

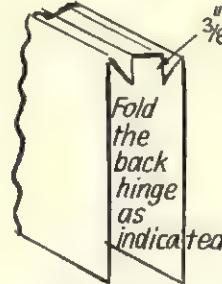


Fig. 43

Fold the back hinge as indicated



Fig. 44

Punch holes and fit Press-Studs through the V-shaped fold.

THE PRACTICAL SENIOR TEACHER

book. It will now be found that the pages are quite firmly secured (Fig. 39, A and B).

Additional pages may be added if required.

FIELD NOTEBOOK

Four pieces of card are required for this exercise: two pieces 6 in. \times 3½ in. and two 3½ in. \times ¾ in.

Cut a strip of binding cloth 4 in. \times 8 in. Apply paste and arrange cards as shown in the diagram (Fig. 40), allowing ¼ in. for each back hinge and ¾ in. for the back fold. Make up the binding case as explained in Type D, using suitable covering and lining papers. Obtain press studs with "long shanks" (Fig. 41a), and fit two through the hinge strips as shown at A in Fig. 41.

Cut a number of pages, 7 in. \times 3½ in., and punch holes the same gauge.

The pages are now placed in position over the shanks AA, and the top cover of the book is closed so that the caps of the press studs engage on the rim at the end of the shanks.

The back may be suitably decorated with a lettering or stick-printing design. If desired, a lace may be used instead of press studs, but the writer has found that the press studs make a more satisfactory finish and, moreover, refills may more easily be inserted.

Fig. 41b shows the finished book.

NOTEBOOK—INVERTED BACK FOLD

A useful size to commence with is 5½ in. \times 7½ in. Cut out two card pieces, 5½ in. \times 7½ in., and make a case (Type A), using a binding strip 11 in. \times 3½ in. Allow 2 in. between the two card pieces (Fig. 42).

Be careful to rub the binding cloth well down. Linen corners will add to the "life" of the case. In all types of loose-leaf books it is suggested that the binding cases should be made fairly substantial.

Fold over the back hinge in the manner indicated in Fig. 43, the arms of the V-shaped folds being ⅜ in.

Punch four holes through each of the V-shaped folds as indicated in Fig. 44. Fix small eyelets in the holes.

Cut the pages, 4¾ in. \times 6¾ in., and place in position in fold X (between the V-shaped folds)

and mark the positions of the holes A and B (Fig. 45). Punch two holes through the pages, and tie by means of a shoe lace. When the book is closed the lace is not visible.

Another form of Notebook may be made as indicated in Figs. 46, 46a.

A LOOSE-LEAF POCKET NOTEBOOK

Construct a binding case (Type A), the size of the cards being 4¾ in. \times 3 in. Leave a space of 1 in. between the card pieces. The strip of binding cloth for placing round the back fold should be 2 in. wide (Fig. 47).

Cut a number of pages (say twenty), 4½ in. \times 2¾ in., and place inside the back. The pages are secured by means of a metal tube pencil extender (supplied by the educational contractors at 1s. 9d. per gross); these serve the purpose admirably. The slit may be slightly opened by forcing a piece of wood along the slit. Now slide the metal tube along the ~~back fold~~, as shown in Fig. 47. Fig. 47a shows how the pages are securely held ~~v~~ v the tube.

The older Seniors may improve upon this device by fixing a bent strip of thin zinc around the back fold before putting the metal tube in position (Fig. 48).

A LOOSE-LEAF NOTEBOOK FOR SENIOR SCHOLARS

Cut four pieces of card (fairly thick), two 8 in. \times 4½ in., and two 8 in. \times ¾ in. Join together by using a strip of binding cloth 3¾ in. wide and 17 in. long. Fix linen corners and make up the case as suggested in Type D. Cut two horizontal slits AA (Fig. 49). Thread the ends of a piece of strong, narrow elastic through these slits, leaving the loop on the outside.

Sew the ends together, leaving about ½ in. overlap. The loop should have sufficient play to allow it to be stretched round the back as shown (Figs. 50 and 50a).

As a preliminary to the above exercise the pages may be held firmly by using an elastic band and placing it carefully round the back, at X and Y (Fig. 50). For this exercise the pages should be 8 in. \times 5 in.

Figs. 50b and 50c suggest an alternative method of making the notebook with a protecting flap.

Figs. 51, 51a, 51b are further suggestions for Class Reference Books.

Albums

Pictures are an invaluable aid to the teaching of many subjects of the curriculum, and children should be encouraged to collect illustrations from

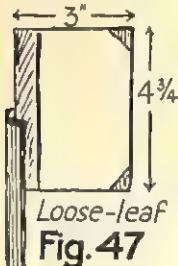


Fig. 47

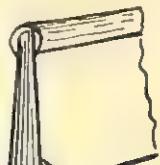
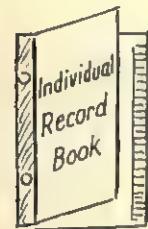


Fig. 47 a



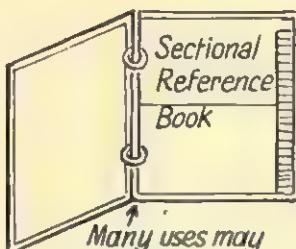
Fig. 48

Fig. 51
Team-Leaders' Record Book

Suggestions for Class Reference Books



Fig. 51b



Many uses may be suggested for this type of book

Fig. 51a

suggestions for providing the necessary thickness in the back fold. The thickness of the stubs will depend upon the purpose for which the book is to be used.

If the albums are to contain post cards, photographs, etc., it is desirable to make the stubs of thin card.

In all exercises it is important to ask the

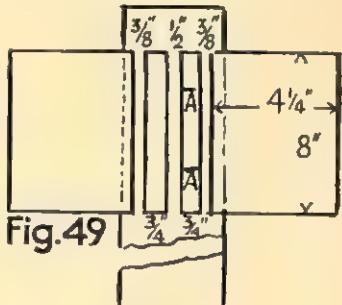


Fig. 49



Fig. 50



Fig. 50a

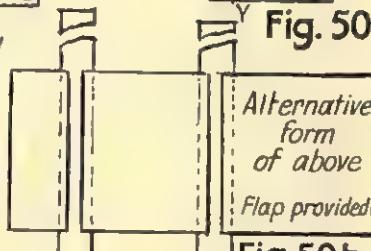


Fig. 50b



Fig. 50c

FIGS. 47-51B

Notebooks and Reference Books

newspapers, guide and travel books, magazines, etc. With backward classes the writer has found that this is the best way of approach for such subjects as history, geography, and science.

It is an advantage to classify such illustrations in different sections or albums.

It will be seen that some provision must be made to prevent the usual "bulge" in books used for the reception of pictures. For "single page" albums, Figs. 52A, 52B, 52C show simple methods usually adopted.

Figs. 53, 54, 55, 56, and 56a are further

children to suggest ideas for further development. Many of the exercises in this section have been suggested by the children. It will be found in practice that one idea leads to another. A child should be allowed to work out his own particular suggestions, and the finished work should be criticized by the class or section. In this way further improvements in design or in the order of performing the various steps may be effected.

GRAMOPHONE RECORD ALBUM

Details of page construction for 10 in. records.

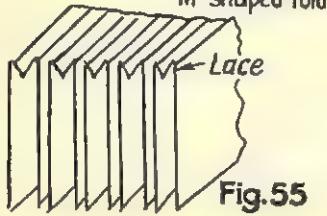
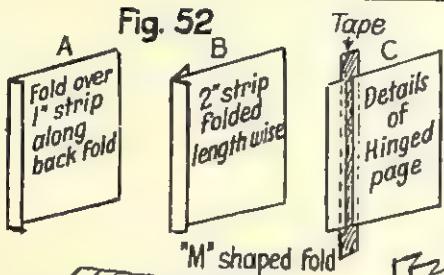
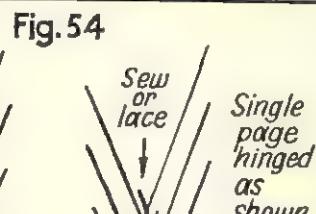
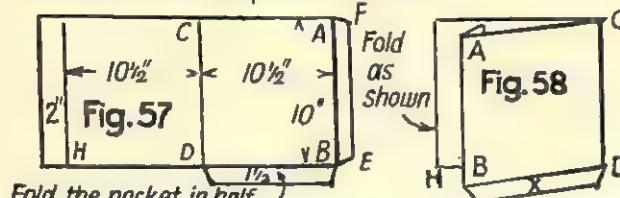


Fig. 55



Album for Gramophone Records



Fold the pocket in half and cut away shaded parts

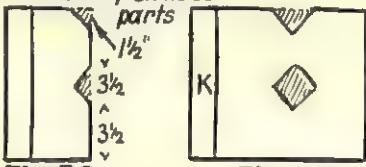


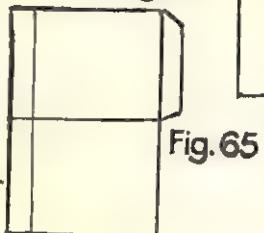
Fig. 59

Fig. 60

Alternative method of cutting the pocket



Fig. 62



11 1/2" > 13" > 10 1/2" >

The back hinge space will provide for twelve records

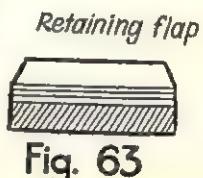


Fig. 63

Circular holes may be cut with a round chisel

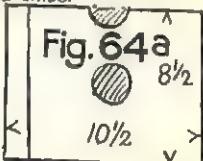
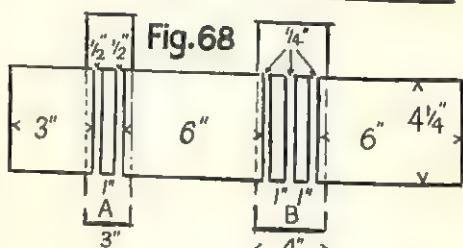


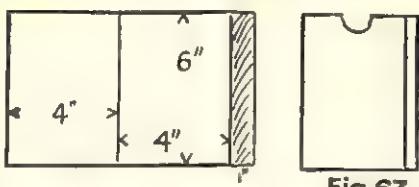
Fig. 64a

8 1/2" >
10 1/2" >



Two plain pages (to be used as an index) should be placed at the front.

Album for the storage of Films



These pockets will accommodate films size 4" x 3 1/2"

Fig. 66



Fig. 70

Album Suggestions

For the pages use either strong brown paper or thin manila card. Set out according to the dimensions given in Fig. 57. Fold inward along the lines *AB* and *CD*. The flap *ABEF* is pasted down as shown in Fig. 58, and the flap *X* is folded round the edge *HD* and pasted to the back of the page. Fold the pocket so that *CD* falls along *AB*. Now mark out according to the measurements in Fig. 59. Cut away the shaded parts, and the page when opened will appear as in Fig. 60.

Paste a strip of thin card (about the thickness of a record) as shown at *K*. Prepare six to twelve pages, according to the number of records it is desired to store in one case. After Fig. 57 has been made, the remaining pages may be drawn, using this as a templet.

Make the covering case in the usual way, the front cover being hinged; quarter-binding is suggested (see Fig. 61). The back hinge in this instance is 1 in., and is designed to hold one dozen records. This may be varied according to the desired capacity.

To secure the pages, punch holes as shown in Fig. 62, and, after fixing eyelets in the back cover, lace in the usual way. To prevent the records falling out, prepare a flap of strong brown paper and paste the shaded part (Fig. 63) along the top of the back cover.

The horizontal lines (Fig. 63) should be scored with a blunt knife.

Circular holes may be cut out by using a round templet (Figs. 64 and 64a). Fig. 65 shows an alternative method of cutting the pages.

Storage albums for other records may be made by varying the size accordingly. Fig. 64a shows the page dimensions for Broadcast records.

PHOTOGRAPHIC FILM ALBUMS

Note. This size may be varied according to the size and type of film used.

This album will accommodate films 4 in. \times 3½ in.

Cut a number of pages, grey or dark-coloured paper, 9 in. \times 6 in. Fold over according to the dimensions in Fig. 66.

Paste is applied to the shaded parts and the envelope completed as in Fig. 67.

It is suggested that one album should contain about fifty envelopes.

Place the envelopes symmetrically together, and by means of a circular chisel cut away thumb spaces as shown in Fig. 67. For the case, cut out six pieces of card according to the measurements in Fig. 68.

Binding strip *A* is 9 in. \times 3 in., and *B* is 9 in. \times 4 in. Linen corners should be fitted. Fold the case as shown in Fig. 69, and place the envelopes in position.

Two holes are punched as indicated, and the album is laced together. It will be an advantage if two pages of exercise paper are placed in front of the album. These may be used as an index to the contents.

These envelopes may be numbered from 1 to 50; by referring to the index any particular film may be found.

To complete the album a press stud should be fitted (Fig. 70).

POST-CARD ALBUM

Make up a case (Type B) according to the dimensions in Fig. 71, leaving ½ in. hinge space and ¼ in. for the front cover hinge.

For the pages choose a grey or brown pastel paper and cut about twenty or thirty pieces, size 13½ in. \times 8¾ in. Fig. 71a shows finished case.

The children should be asked to suggest various methods of affixing the post cards. The following suggestions may be tried—

(a) By means of a knife cut slits to hold the corners of the post cards. If a chisel is used about a dozen pages may be cut together (Fig. 72).

(b) Affix gum mounting corners. These may be bought quite cheaply, and are usually used in connection with photo snaps (Fig. 73).

(c) Cut vertical slits and slide the post cards underneath. The slits should be ¼ in. longer than the height of the card. The width of the slit will depend upon the nature of the paper used. With strong tough paper the slit may be narrow, say, ½ in. (Fig. 74).

(d) Corners may be made separately as follows—

Cut a number of squares of paper, side 1 in. Fold diagonally; cut away shaded part (Fig. 75). Paste together the parts *A* and *B*, and the corner pocket will be formed (Fig. 75a). These

may be pasted on the pages according to the dimensions in Fig. 76. These distances allow for the cards to be easily affixed.

(e) Fold $\frac{3}{4}$ in. strips of thin manila card "lengthwise" and place at the top and the bottom of the page. These are now "machined" to the page at a distance of $\frac{1}{8}$ in. from the top and bottom edges (Fig. 77).

It will be found that these hold the post cards quite securely.

(f) Fold a piece of brown paper $13\frac{1}{2}$ in. \times 4 in. (Fig. 78) so as to make a folded rectangle $6\frac{1}{4}$ in. \times 4 in. (Fig. 79). Cut out a rectangular space 5 in. \times 3 in. This may be done (using scissors) by folding along the dotted line (Fig. 80).

Paste a strip about $\frac{3}{4}$ in. from the bottom of the page (see shaded part, Fig. 78) and fold over. After preparing about twenty such pages make a binding case (Type B) and place the edge marked AA in the hinged side of the case (Fig. 79).

DUPLICATE STAMP ALBUM

Cut strips of transparent paper 1 in. wide. Paste as shown in Fig. 81 for a distance of $\frac{1}{4}$ in. from the lower edge. Half an inch overlap is allowed at each side for pasting on the reverse side, or strips of paper $\frac{3}{4}$ in. folded lengthwise and pasted along AA and BB.

Fig. 81a shows the completed page.

Fig. 81b indicates how the pages for a stamp album should be hinged.

HISTORY AND GEOGRAPHY SCRAPBOOK

Cut two or three strips of brown paper 10 in. wide and form into a continuous strip by pasting end to end and leaving 1 in. overlap. Fold over backward and forward (zigzag fashion) into folds $6\frac{1}{4}$ in. wide (Figs. 82 and 83). For the back cut two pieces of card $6\frac{1}{4}$ in. \times $10\frac{1}{2}$ in. Cover all over with binding cloth, allowing $\frac{1}{2}$ in. overlap all the way round (Fig. 84). If desired, a designed panel $8\frac{1}{2}$ in. \times $4\frac{3}{4}$ in. may be pasted on each half of the back.

Paste is now applied to the back and front folds, and the card pieces are fixed in position. It will be seen that the book opens two ways. The front opening may be used for one series of illustrations and the back way for another

series (Fig. 85). If the book is to have much use, the edges of the folded pages may be bound in *passe-partout* fashion.

Plain pastel paper may be used for the back panels. This may be decorated with a stick-printing border or a lettering design.

Small Books

ONE SECTION

Take a large sheet of paper, 30 in. \times 22 in., and fold over four times. Cut the edges with a knife, stitch in the usual way, and tie the ends (Figs. 86 and 87).

To strengthen, paste a binding strip around the back fold. This may be done either before or after stitching (Fig. 88).

If a rigid back is desired, thin card may be pasted to the front and back covers; the card should overlap the binding strip by about $\frac{1}{4}$ in. The edge of the card may then be cut flush with the edges of the page (Fig. 89).

If the book is fairly large, the stitching may be varied (Fig. 90); the two ends A and B are tied together. The whole of the back may then be covered with a piece of thin card.

BOOK—SINGLE PAGES

A book may be made with single pages as follows—

Fold over a strip along the side of each page (Fig. 91), and arrange the pages as shown in Fig. 92.

The book may then be stitched together as before. Another method of dealing with the single page book is to join two pages together with a strip of paper. These two pages may then be treated as one folio (Fig. 93).

TWO-SECTION BOOKS

First Method

With small books two sections may be stitched together as illustrated in Fig. 94. The two ends A and B are tied together.

Second Method

Thread the needle through A, out through B, in through C, out at D (Fig. 95), in through E, out at B, in through C, out at F. The two ends

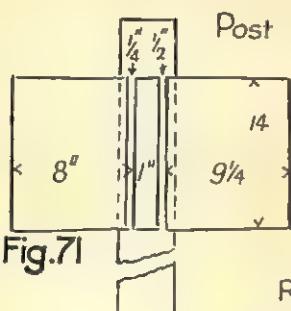


Fig. 71a

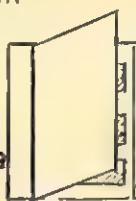
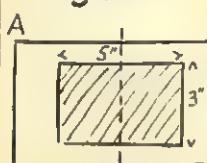
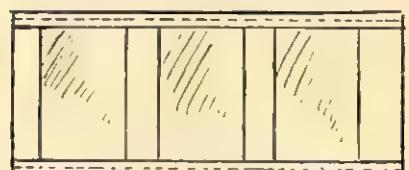
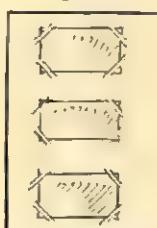
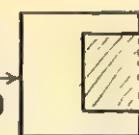


Fig. 74

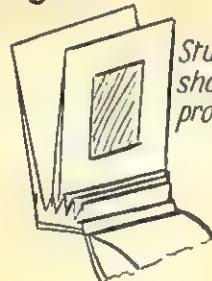


Fold along the dotted line and cut away the rectangular portion

Fig. 80



A Fig. 79



Duplicate Stamp Album

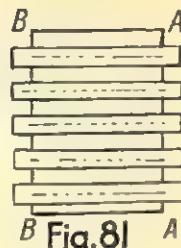
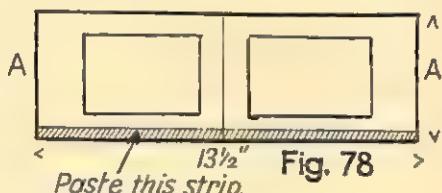


Fig. 81a



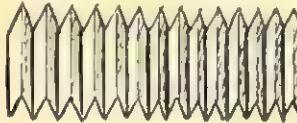
For a Stamp Album the pages should be thick paper or thin card

Fig. 81b
The pages should be hinged by means of a tape

History and Geography Scrap Book

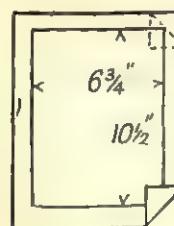


Fig. 82



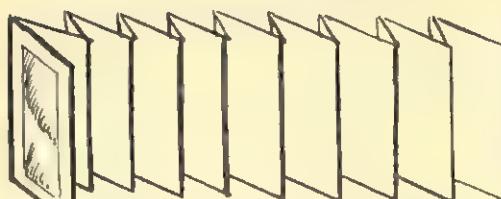
Fold over backwards and forwards [zig-zag] at intervals of 6 1/4"

Fig. 83



The back covers are made separately

Fig. 84



It will be seen that the book opens two ways

Fig. 85

For strong wear bind the folds with passe-par-tout strips.

FIGS. 71-85

Further Album Suggestions

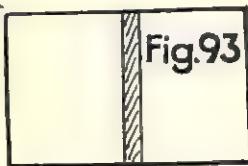
THE MAKING OF SMALL BOOKS



With large folios vary the stitching.



*The pages are now stitched as before.
The folded strips act as stubs.*



Joining together two single pages.

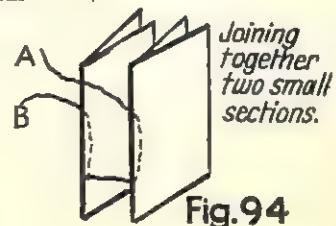


Fig. 94

With single pages fold over a strip 1" wide along one side.

GENERAL SCHOOL BLOTTER

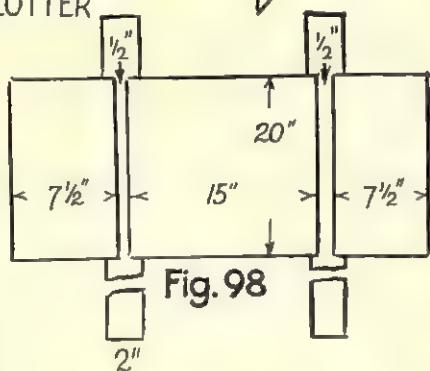
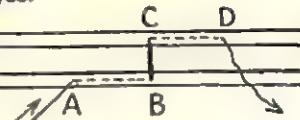


Fig. 98

Fig. 95



The stitched folios may be bound in a case Type A.

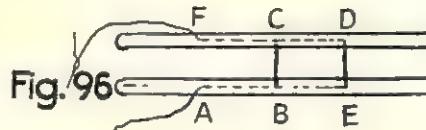


Fig. 97



SUGGESTIONS FOR BLOTTER FITTINGS

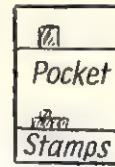


Fig. 99

Calendar Suggestions.

Fig. 100

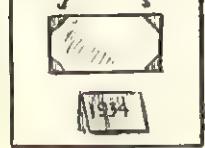


Fig. 100a

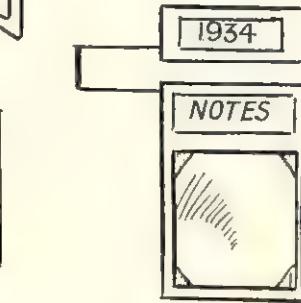


Fig. 100 b

*Blotter and
Calendar
Suggestion.*

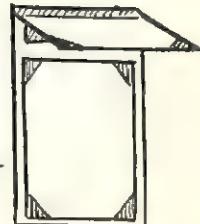


Fig. 100 c

are now tied together (Fig. 96). With three sections, proceed as with two sections. When the ends have been tied together thread the needle through *G*, and out at *H*, make a loop round the stitch *C*, return the needle through, and out at *I*. Fasten off the thread round stitch *D*.

Any number of sections may be stitched in this manner (Fig. 97).

GENERAL SCHOOL BLOTTER

Cut out three pieces of card, 20 in. \times 7½ in., 20 in. \times 15 in., 20 in. \times 7½ in. Join together by means of strips of binding cloth, 2 in. wide and 4½ in. long, leaving hinge spaces of ½ in. Fit corners of bookbinding cloth (Fig. 98).

Cover the back with imitation leather paper and line the inside with pastel paper.

Many ideas will suggest themselves for the inside fittings.

A blotter pad, 14 in. \times 8 in., may be cut from thin card; this may be fixed in position as shown (Fig. 99).

A copy of the school time-table placed above the blotter will prove very useful.

Pockets for the holding of notepaper and envelopes may be fitted as shown.

Other suggestions will include—

- A jotter pad.
- Daily reminder list.
- Calendar.
- Stock to order.
- School holiday list, etc.

Figs. 99a, 99b, 99c are suggestions for blotter fittings.

Ideas for Calendars are given in Figs. 100, 100a, 100b, 100c.

CLASS-MARK BOOK

Cut out three pieces of card, as indicated in Fig. 101, and make a binding case as Type B. The binding strip placed round the back should be 18 in. \times 4 in.

Cover and line with suitable papers.

Take about twenty single sheets of foolscap (ruled ½ in. squares) and with a sharp knife cut off a strip 1½ in. wide. The back page should be left full size. Punch holes through

the back of the binding case and fix eyelets (Fig. 101a).

Punch holes in the pages (the correct gauge), and secure by a lace or binding screws. The names of the scholars are entered on the back page as shown, and a separate page may be used for each week's or month's marks. The page will, of course, be ruled according to one's requirements. As an alternative, the pages of foolscap may be left full size, and the names of scholars written on a hinged strip of cardboard (Fig. 102).

If the term's marks are required, another hinged card (but wider) may be fixed on the right side similar to the "names" strip.

The summary of marks gained may be entered each week or each month.

TEACHER'S RECORD BOOK

The stereotyped record books and diaries usually advertised for teachers' use are often inadequate for the general needs of a class. As the curricula in schools must vary in different localities, so will the needs vary.

A school should build up its own particular type of record book; provision may then be made for the particular requirements of the school and of each individual class.

The writer has adopted a loose-leaf record book which may easily be adapted to satisfy the needs of the various classes in his school.

Make a binding case (Type A) in quarter-binding style. Cut out of fairly stiff card two pieces 14 in. \times 8½ in. The binding strip placed around the back fold should be 29 in. long and 2½ in. wide. Allow for a space of 1 in. between the card pieces (Fig. 103).

Fix eyelets 4 in. from the top and bottom of the front and back covers as shown in Fig. 104a. Punch holes (the same gauge) in a number of single sheets of writing foolscap, and secure them in the cover by means of loose-leaf rings. Indent each page about 1 in. from the right edge. Use the first half of the book for entering up the schemes of work. The titles of the schemes may be written in red ink. Use the succeeding pages for the diary of lessons, the names of the subjects being written in black ink. These pages may be ruled as desired; a simple arrangement, as in Fig. 104, proves quite satisfactory.

The remaining sections in the book may be used for—

Examination marks.

Periodic tests.

Head Teacher's terminal reports.

Suggestions.

Notes concerning special children in the class, e.g.—medical cases, glasses, etc.

A suitable label should be pasted on the outer cover (Fig. 104b).

For the refills cut off 1 in. strips from some foolscap pages and punch holes as before. These may easily be inserted when required.

Writing Pads and Jotters

SIMPLE JOTTERS

A convenient size of jotter for school use is 5 in. \times 9 in. Use fairly thick card and bind the edges (*passe-partout* style) with strips of binding cloth $\frac{1}{4}$ in. wide. Cut a piece of cloth, 4 in. \times 2 in., and fix on the side of the card as shown (Fig. 105), leaving sufficient loop to accommodate a pencil (it is advisable to place a pencil in the loop when fixing the band). Apply panels of suitable covering paper, leaving $\frac{1}{4}$ in. margin all round (Fig. 105a).

Prepare the pad as follows: Cut a number of sheets of writing paper, 4 in. \times 8 in. For the back sheet use thin card. "Knock" the edges together, being careful that the top edges are coincident. Place between two boards, allowing the top edges to project about 1 in. Brush over with glue and bind with a *passe-partout* strip. When dry, paste in position on the jotter card.

An improvement on the method of attaching the jotter is to provide a "pocket" into which the back of the jotter may be placed. It is suggested that the pocket may be made separately, according to the details in the diagram (Fig. 106), and then pasted in position on the jotter card.

Note. Jotter pads may be made from exercise books by brushing the top edge with glue and binding with a strip of paper. When dry, cut off the strip (say, $\frac{1}{2}$ in. wide) along the back fold of the book (Fig. 107).

A combined Jotter and Blotter may be made as suggested in Fig. 108. Figs. 109, 109a show

a further development of this type of exercise. The details of an Office Blotting Pad are shown in Figs. 110 and 110a.

Rebinding Worn Books

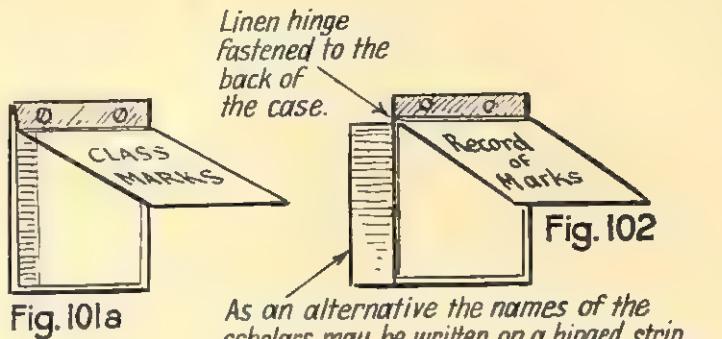
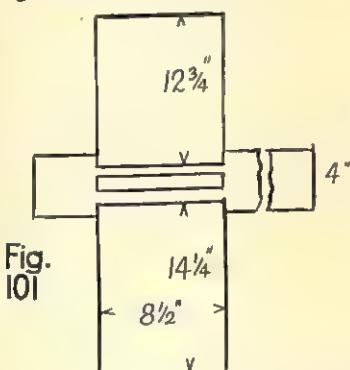
The rebinding, or (more correctly) re-casing, of books will inculcate in the pupil not only the desire to take care of the books, but also appreciation of the value of handling them correctly.

To repair a damaged book, first remove the contents from the case, being careful to keep the tapes intact. Pull off all loose glue and paper from the back and tear off the end-papers. Prepare fresh end-papers (the zig-zag type is found to be more satisfactory), and stitch these one at the front and one at the back. The needle should pass from inside the fold of the end-paper, encircle the tape, and back again to the inside fold. Repeat this at each tape; it will be advisable to link up these "end-paper" stitches with those of the book sections.

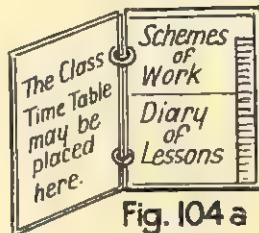
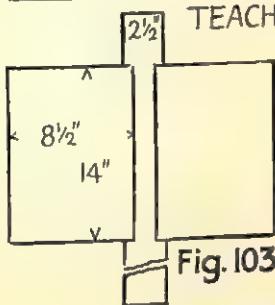
The next step is to repair the contents. To mend a torn page paste strips of transparent adhesive paper on each side of the page over the tear. Loose pages, pictures, and plates should be inserted by pasting a strip about $\frac{1}{8}$ in. wide along the inner margin. The book is now ready for trimming. Cut off, using a plough or guillotine, about $\frac{1}{8}$ in. from head, tail, and fore-edge. Ascertain whether the printed matter will allow for this.

Place the book between backing boards in a vice, the back edge projecting about an $\frac{1}{8}$ in. Brush fresh thin glue over the back edge, being careful that no surplus glue runs down the edges at the head and tail; lightly tap with hammer. Leave for a short time to allow the glue to set. Cut a strip of brown paper and apply to the back edge (for a hollow back this brown paper should be tubular). Tear off the waste sheets of end-papers, then paste down the tapes. A strip of book muslin placed round the back edge will strengthen the book. Prepare two card pieces, each being $\frac{1}{4}$ in. more than the length of the book and $\frac{1}{4}$ in. longer than the distance from the back groove to the fore-edge. Be careful to ascertain the distance necessary between the boards. Make the case full, half, or quarter

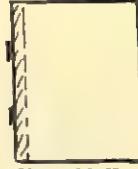
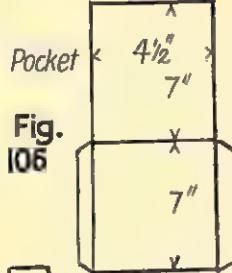
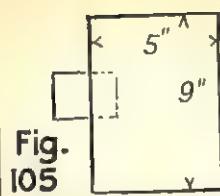
CLASS MARK BOOK



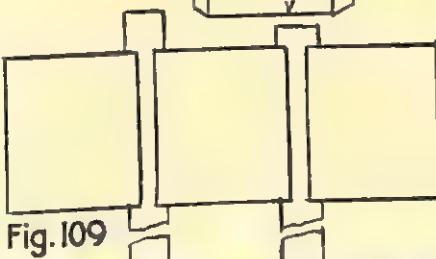
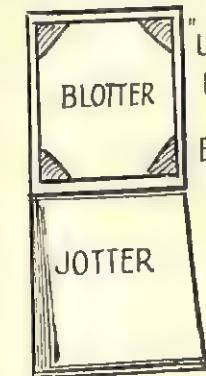
TEACHERS' RECORD BOOK



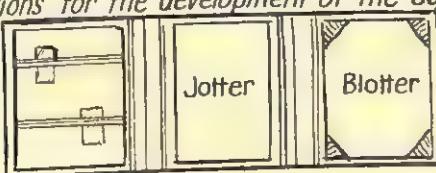
TYPES OF JOTTERS



Alternative method of fixing the corner
Bind with Passe-par-tout strips.



Suggestions for the development of the Jotter type



Leave 1/4" strips of binding cloth showing all round.

binding. Place pieces of waste paper under the end-papers.

Apply paste to front, back, and back edge, and place the book in the case, being careful to see that the margin is even all round. Protect the back with pieces of waste paper and place in a letterpress to dry.

Materials

OBtainable Through General School Contractors

Scissors, cutting boards (zinc or strawboard), boxwood rulers, safety rules (forged steel), knives (sloyd pattern), paste brushes, embossed and other covering papers, set-squares, pastel papers, tape, and cord.

Bookbinding cloth. Good quality may be bought at 1s. per yard (36 in. wide).

Punches. These may be obtained with adjustable nipples. Price from 2s. 6d. to 3s. 6d. Special pliers are now obtainable for punching holes (of various sizes), fixing eyelets and press studs. Complete outfit about 6s.

Sheath and spear tags, laces of various kinds, binding fasteners (with washers).

Eyelets. These may be obtained from boot repairing shops at 1s. 6d. per thousand (usually sold in black or brown).

Flour Paste

To make paste suitable for this work take $\frac{1}{2}$ lb. coarse flour and $\frac{1}{2}$ oz. of alum. Mix with cold water to form a thin paste (be careful to break up all lumps). Stir in boiling water until

the paste thickens. Heat gently in enamelled pan. Stir continually.

When it begins to boil add a few drops of oil of cloves or oil of peppermint and allow to cook for about five minutes. It should then form a thick paste. This can be thinned with warm water (if desired).

For pasting paper it should have the consistency of cream. For cloth and leather it can be thicker.

Paste made with alum will keep for about a fortnight, but if a few drops of oil of cloves or oil of peppermint are added it can be kept much longer.

Sour or watery paste is useless, and should be thrown away.

Gum

For sticking envelopes and labels.

Dissolve about a tablespoon of gum arabic in about $\frac{1}{2}$ pint of water. Place in double pan and heat, but do not boil. Add a few drops of glycerine.

Keep in a closed jar.

Hints on Pasting

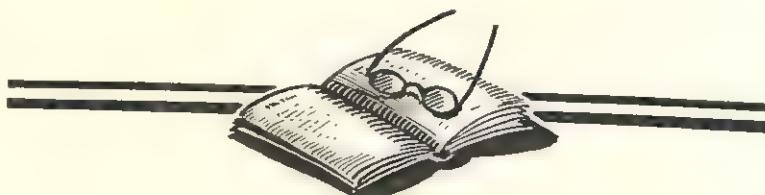
Commence at the centre of the paper and brush outward.

It is advisable to put a piece of newspaper underneath.

Avoid lumps of paste and bristles on the paper.

Apply pasted paper to the board, cover with piece of paper, and press with hands.

It is important to paste the paper, not the board.



RAFFIA BASKETRY

COILED Raffia work continues to maintain its popularity as a craft for use in schools, and is likely to do so for a long time to come. The material is very adaptable and the wide range of colours obtainable allow for plenty of scope in arranging pleasing colour schemes in the making of mats and baskets. Straightforward patterns consisting of coloured bands or geometrical shapes are more fitted for the work than unbalanced designs or pictorial scenes. In view of this the latter should be avoided. As in all crafts where natural materials are used, a knowledge of the growth and preparation of the material is not only useful but essential, in order to confine the material to its proper use in the production of articles fitted for their purpose.

The Materials

Raffia is often erroneously described as a species of grass, but it is really the skin of the immature leaves of the Raffia Palm, which grows almost exclusively in Madagascar. The natural colour is of a pale cream which is pleasing in appearance, but added interest is given to the working of the material if it is dyed in various colours with vegetable, aniline, or ordinary household dyes. Three kinds of dyed raffia are obtainable from most suppliers: namely, dry dyed, specially prepared, and glycerined. The first two named are preferable to the glycerined kind, as the latter is very moist and the strands tend to split into shreds when being worked. Natural raffia or any waste raffia may be used for the foundation coil. Other materials used for this purpose are cane, string, and thick cord. Care should be taken in selecting suitable materials for the foundation of coiled work. If a fine coil is required, pulp cane is most suitable; but for thick coils, several strands of raffia will be more satisfactory. String and cane may be used in conjunction to form flat double coils.

Very few tools are required for raffia work; a knife is useful for tapering the ends of cane,

but in schools a pair of scissors and No. 17 tapestry needles will be needed for the ordinary coiled work. Blunt-pointed needles are generally used, but sharp-pointed needles are necessary for certain kinds of raffia work.

Pattern and Design

The educational side of the craft should be developed rather than neglected, as preliminary lessons in Design and the right use of colour and decoration will help to raise the status of the craft. If neatness, accuracy, and good workmanship are combined, the results will be full of interest. Decoration must always be worked into the basket in a constructional form and should not be applied afterwards as an ornament. For instance, it would be wrong to embroider a design of flowers on a coiled basket. Each part of the design should be built up coil by coil as the basket grows.

In the Indian baskets of early days, every pattern had a meaning, such as the representation of dance, a flight of birds, a streak of lightning, or footprints of a bear, and these were the outcome of the worker's inspiration. The tendency nowadays is to embellish an article with too much decoration, probably caused by striving for effect, or with the desire to make the work look pretty; the result being too ornate and fussy in appearance, rather than what it should be—a piece of fine workmanship of good design well carried out and fitted for its purpose.

Storage

The storage of raffia is often a problem owing to the untidiness of carelessly handled bundles, but this can be avoided if large bundles are parted into smaller ones. The raffia should be straightened out, then doubled in the centre to form a hank, and tied round with a strand of raffia about 6 in. from the doubled end. Each strand as it is required may be drawn out without disturbing the rest, and the bundle remains

tidy in appearance. It should be noted that coloured raffia requires no damping, but natural raffia if previously damped and allowed to dry will broaden out into wide strands and become more pliable in use. All wide strands need to be split into suitable widths with the point of a needle, which makes for economy and greater neatness in the working of the material. Every kind of stitch used in coiled work should be drawn up tightly before the next stitch is made, to ensure firm and rigid work. This fact is often overlooked during the lesson, and in consequence

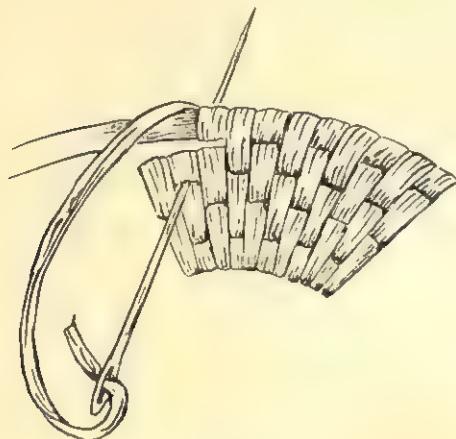


FIG. 1
Lazy Squaw

the work is loose and unsatisfactory. If this advice is carried out, there will be more certainty of a successful result in attempting to produce a work of art that is also a thing of beauty.

Various Stitches and How to Make Them

LAZY SQUAW

Lazy Squaw (Fig. 1) has proved to be a very popular weave, and pleasing results are obtained when an even width of stitch is maintained, and the stitches pulled very tightly. The usual way is to make one wrap round the free coil, then to make the long stitch, inserting the needle under the previous coil so that the stitch actually passes over two coils. Each long stitch is followed by one wrap round the coil. An improve-

ment in the appearance of the work will be produced if two wraps are made instead of one between each long stitch.

In a mat or base of basket, all the long stitches should radiate in straight lines from the centre, but it will be necessary for extra stitches to be made as the spiral increases in size. To do this, make a V-shaped stitch, the extra stitch being inserted in the same hole as the previous long stitch. These V stitches should be inserted when the long stitches slant in a line past the centre, instead of directly to it. A variation of

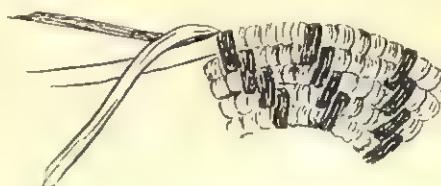


FIG. 2
Peruvian Coil

Lazy Squaw is made by taking several wraps round the coil between each long stitch, and is known as the Lazy Weave.

PERUVIAN COIL

This (Fig. 2) is another variation of Lazy Squaw. The work is commenced in the same way, but extra wraps round the coil between each long stitch are made to widen the distance between each stitch. Each long stitch is made on the left side of the long stitch on the previous row. When the stitches are about $\frac{1}{2}$ in. apart, it is necessary to start a new series of long stitches in the middle of each space in order to make the work firm and solid. A different coloured strand may be used for making the long stitches, to form a contrast to the background. In the sides of a basket an even width of space between the stitches should be maintained.

NAVAJO, OR FIGURE EIGHT, STITCH

This stitch (Fig. 3) produces very firm baskets, as each stitch tends to tighten up the work on the previous row. Narrow strands of raffia $\frac{1}{8}$ in. wide are more suitable than wider strands for making this weave, as the tightness of the

weaving would cause broad strands to become ragged and unsightly. To make the stitch, the raffia should be taken over the coil towards the back and brought under the coil, then taken through the work under the previous coil, and finally brought up between the solid work and the free coil, in the form of a figure eight. The movement is repeated for the next stitch.

KNOT STITCH

This stitch (Fig. 4) is often mistaken for the Mariposa stitch. The only difference in appear-

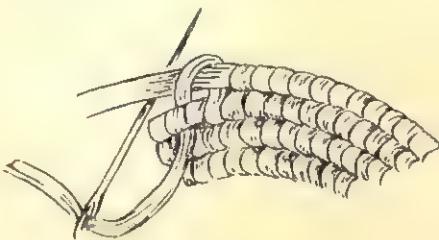


FIG. 3
Navajo or Figure Eight

ance is that the tie or knot in the centre of the stitch shows only on the front of the Mariposa weave, whereas in the real Knot stitch the tie shows on both sides of the work and produces much firmer work. A long stitch is made at the back of the work, over two coils, then a long stitch is made at the front. The needle should then be brought through under the coil and on the left side of the long stitch, and is reinserted after passing across the centre of the long stitch. To complete the stitch take the raffia across the long stitch at the back, and bring the needle through to the front on the left side of the long stitch. Take one wrap round the coil before repeating the movements to make the next stitch. In making the Mariposa stitch no long stitch should be made at the back.

Plate Mat

PERUVIAN COIL

Materials required—

2 oz. Natural raffia.

A few strands each of two colours.

The mat is shown in the Colour Plate facing p. 64.

In order to obtain really good results in the making of coiled baskets, it is advisable to make a round plate mat first. The reason for this is that the pupil may become familiar with the working of the material and the formation of the coil, and also the method of introducing pattern by means of decorative stitches in colour to form relief.

A good plan is to make a mat with different bands of various stitches, and the finished speci-

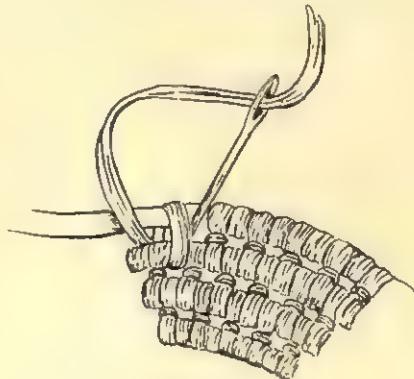


FIG. 4
Knot Stitch

men may be used as a kind of sampler for future guidance. The most useful stitches used in coiled work are, Lazy Squaw, Mariposa, West African, Navajo, and Peruvian. The last-named stitch is selected for the mat about to be described. It should be remarked that a basket takes a considerable time to complete, and it will have a greater value, if the workmanship is very good, being free from the defects which occur in practice work. When the mat is completed, the worker will feel more proficient and better able to attempt the making of a basket, which requires great care in the shaping of the sides and in balancing and regulating the pattern.

If only one kind of weave is used for the mat, e.g. Peruvian coil, then the following directions will need to be carefully carried out.

The pattern formed by the arrangement of long stitches is quite easy to do, and added interest is given if the bands are worked in a second colour. Assuming that Saxe blue and

beige are selected for the colour scheme, commence by threading the needle with a strand of blue raffia about $\frac{3}{8}$ in. wide (a No. 17 Tapestry needle is very suitable). Now take six strands of natural raffia, taper the end by cutting with scissors in a slanting direction. Bind the tapered end, using the blue strand farthest from the needle, then curl the end round in a diminishing spiral showing a tiny hole in the centre. You are now ready to start the weave.

Insert the needle through the centre hole from the front, the loose coil being towards the left; now bring the sewing strand over the loose coil and make two wraps round the latter, then



FIG. 5

Tapered End of Cane to Start the Coil

insert the needle through the centre hole to make the second long stitch. Repeat the movement until the round is complete. At this stage there should be no hole showing, since it has been filled with the long stitches. Make every stitch very tightly and continue wrapping round the coil until a long stitch in the previous row is reached, then make one long stitch over the two coils and not through the centre hole. Each succeeding long stitch should be made on the left side every time, to form the radiating pattern. As the work increases in size, the number of short wraps will gradually increase, but when the latter are $\frac{1}{2}$ in. wide between each long stitch, a new series of long stitches should be commenced midway between the existing ones, otherwise the long stitches will become too far apart to be practical. Thicken the coil gradually by inserting a doubled end of natural raffia; when the desired thickness is obtained keep the coil even in width. A firm mat will only be possible if the stitches are worked tightly. A new strand of blue raffia should be inserted in the coil when there is about 6 in. of the sewing strand left. Do not unthread the

needle until the end of the end of the new strand has been well bound in with the sewing strand. Now thread the needle with the new strand, and bind in the old end with the succeeding wraps.

When the mat measures 4 in. across, insert the end of a beige coloured strand of raffia and complete two rows in this colour; then continue with blue for the next two rows. Use beige raffia for the next two rows, and finally blue for the outside coil. The mat should now measure about 7 in. across. Care must be taken in arranging for each reversion of colour to be made in one direct line from the centre of mat. To finish off, taper the end of coil for about an

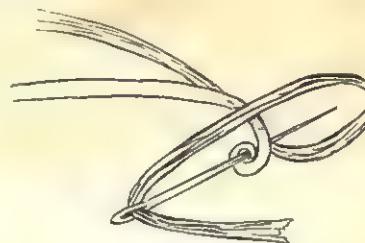


FIG. 6

Commencing Cane Coil

inch, then bind this end to the previous coil to make a neat graduated finish. If the work is well done, both sides will look alike and the mat will give the impression of not having a right side and a wrong side. Carefully singe the work to neaten its appearance, and press the mat under a heavy weight for a few hours. (See Colour Plate.)

Round Plate Mat

NAVAJO STITCH

Materials required—

2 lengths of No. 8 cane.

3 oz. Raffia in selected colours.

2 Blunt No. 17 tapestry needles.

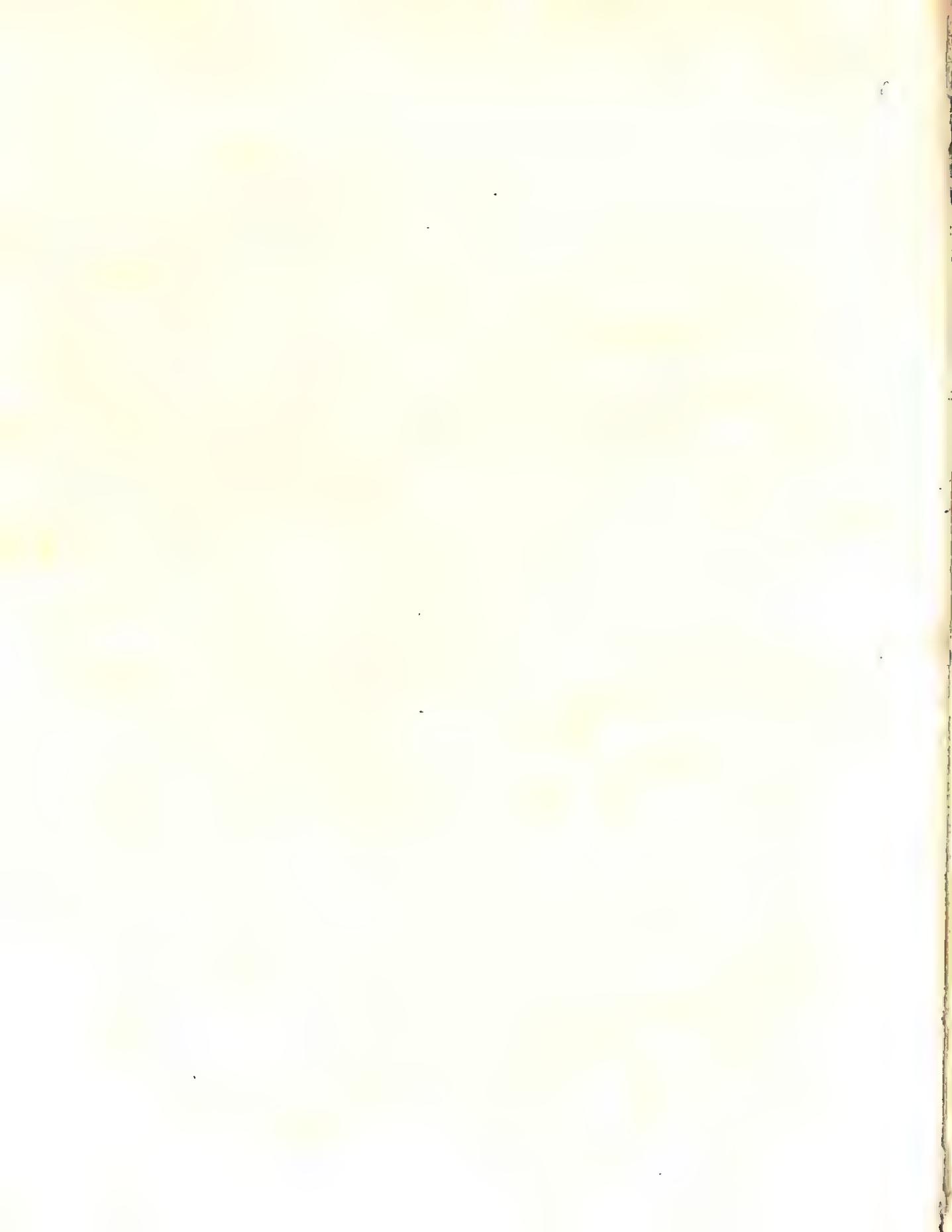
The foundation of this mat is of cane, but a neat commencement may be made by using three or four strands of natural raffia to form the start of the coil, before the cane is introduced. After two or three rows of the spiral have been worked in Navajo Stitch with natural raffia (see Fig. 3), a tapered end of cane should



COILED RAFFIA BASKETRY

Plate in it in Peruvian Coil
Bowl in Water-lily Design

Basket in Modern Design
Oval Lidded Basket



be inserted in the centre of the raffia coil. Continue sewing in the usual way until the cane is securely held in position. Cut off the raffia coil and continue now with the cane as a foundation.

When the work, or button as it is called, measures $\frac{3}{4}$ in. across, introduce a strand of blue, which should be threaded on a needle other than the one already being used. Make two stitches with blue raffia, at the same time bury the natural strand with the coil, then make two stitches with the natural strand and bury the blue strand. Continue making two stitches with each colour alternately for one row. Three rows are now to be worked with brown raffia. Carefully shape the coil as the work proceeds, making the coils as circular as possible. You are now ready to commence on the trefoil pattern. First divide the circumference into three equal spaces, using small pins stuck into the coil at the points to be indicated. Commence the trefoil pattern in orange raffia. The kite-shaped background is also to be started in this row with blue. Increase the width of each section of the trefoil by one extra stitch on each side in orange, and at the same time bury the blue raffia until it is required. All stitches must be tightly made; when the work measures 4 in. across, commence to reduce the width of each of the blue sections and also the trefoil. The blue sections will need to be gradually reduced. In this row two stitches are made with brown, two with natural, then two

with brown on each side of the orange sections. In the next row the number of stitches in natural is increased to six. Continue to frame the edges of the trefoil with brown, then natural, using six or more stitches as required, to give the correct shape and balance.

The natural-coloured border is surrounded with steps of green and the rest of the back-

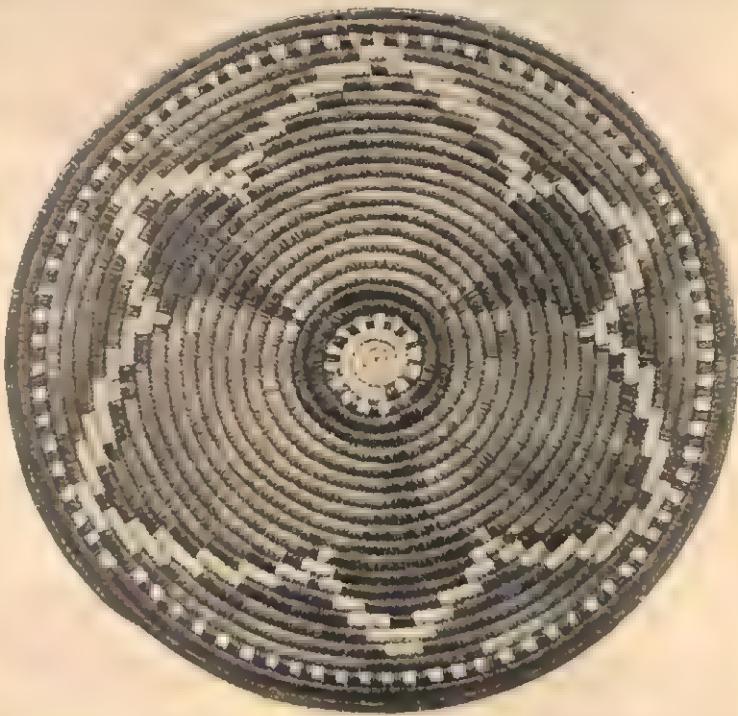


FIG. 7
Round Plate Mat



FIG. 8
Showing how Finishing End is Bound

ground is worked in green. When the tips of the trefoil are made, work one circle in blue and natural, three stitches of each being worked alternately. The two outer coils are now to be worked with brown raffia. To finish, taper the end of cane on the inside for about 1 in., then cover the tapered end with the same kind of stitch which has been used throughout and make the end of the sewing strand secure. Cut away any projecting ends of raffia and put the mat under a press for a few hours to flatten.

Bowl-shaped Basket

WATER-LILY DESIGN

Materials required—

- 3 lengths of No. 8 cane.
- 3 oz. black raffia.
- A few strands of yellow and bleached white raffia.
- 2 No. 17 tapestry needles.

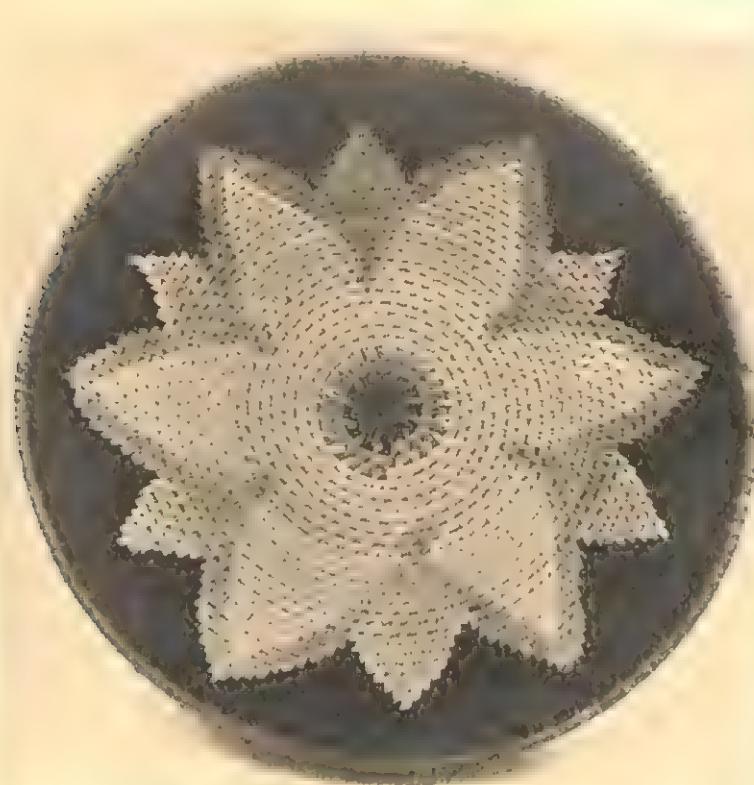


FIG. 9

*Bowl-shaped Basket : Water-Lily Design**See also Colour Plate facing page 64.*

The illustrations show how interesting the design appears on the inside of basket, and from them the diagram can be made. The most suitable foundation is of No. 8 cane, although a raffia coil will give good results. The flower is worked in yellow and white raffia, black being used for the background and sides of the basket.

Anyone with an elementary knowledge of coiled work will find that the design is not difficult to carry out, but accuracy is essential in marking out the pattern. Before commen-

ing the coil, take a sheet of drawing paper and, with the aid of compasses, make a full-sized diagram of the design, so that each change of colour can easily be made at the correct points by placing the work over the diagram when necessary. A small pin stuck in the edge will serve as a guide, and it can be removed when it has served its purpose.

When each different-coloured strand is introduced, the previous strand should be carried along and bound in with the coil and then picked up again when required.

As the design is seen to best advantage from the inside of the basket, the building up of the sides should be done from the inside. This method differs from that employed in the making of lidded baskets, where the pattern shows best on the outside. In the latter case the sides are built up from the outside.

It is necessary to check the work often with the diagram, rather than merely trust to the eye. A well-balanced shape will be obtained if you arrange for the inside edge of each coil to rest in the centre of the previous coil. Keep looking to see if one-half of the previous coil is always in view.

The commencement is made as described in the making of the trefoil-pattern coiled mat, but Lazy Squaw stitch should be

used throughout. By referring to the illustration to note where the different colours are introduced and by using the diagram, a detailed description or lengthy directions is rendered unnecessary. The ordinary rules are followed, but care must be taken in shaping the sides of basket. A further aid is the use of the cardboard template, as example in Fig. 12. If the template has been placed across the centre of basket when every two rows are worked, the shape may be adjusted as follows. Should the sides be too

narrow for the template to fit correctly, the top coil may be pressed outward a little all round. In the event of the sides being too wide, the cane coil may be slightly drawn tighter and the coil pressed inward, to give the desired result.

In Lazy Squaw Weave, the needle should never pass through any long stitch, but must pass between the long stitches. There will be less risk of splitting the stitches if two wraps are taken round the coil between each long stitch. As each stitch is formed, do not allow the raffia to become twisted to spoil the appearance of the stitch. The making of a smooth flat stitch should be aimed at.

Lidded Basket

MODERN DESIGN

Materials required—

- 4 oz. Natural raffia.
- A few strands each of two selected colours.
- 2 No. 17 tapestry needles.
- 3 lengths of No. 8 cane.

The basket is shown in the Colour Plate facing p. 64, in black and yellow raffia.

Navajo, or Figure Eight, Stitch is used for making this rather advanced piece of work on a cane foundation. A raffia foundation would serve, failing the use of cane, but greater care would be required in maintaining an even narrowness of coil. In choosing a foundation material, a safe rule to follow is to use cane for thin coils, and raffia for coil foundations which are thicker than $\frac{1}{8}$ in. It would be unwise to reverse this order, as the use of thick cane would tend to loosen the stitches on account of the springy nature of the cane. A narrow coil composed of raffia is apt to become uneven in width.

The basket illustrated was made on a cane foundation and, as a result, is very firm and rigid.

The planning of the design should be carefully done. Each section of the design to be repeated round the basket should be of such a size that it will be well balanced and fit correctly. Wide strands of raffia should be split, with the point of the needle, into strips $\frac{1}{8}$ in. wide. This will

ensure the work's being neat and attractive in appearance when Navajo Stitch is employed.

Commence to make the base in the usual way, using three or four strands of raffia to start the coil. Have needle ready, threaded with a natural strand of raffia, then bind the tapered ends of coil. When a tiny spiral is made, commence to make the figure-eight stitch (see Fig. 3). The free end of coil must point towards the left while the work is in progress; when three or four rows are completed, insert the tapered end of cane in the centre of the raffia coil and

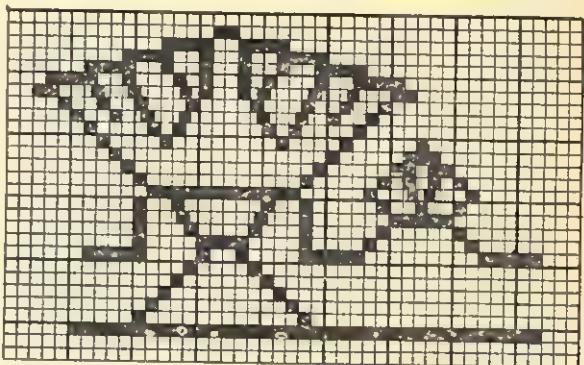


FIG. 10

Design on Squared Paper

See Lidded basket in modern design (black and yellow), Colour Plate facing p. 64.

cut off the raffia strands, because from now onward the foundation will be of cane. Make the base slightly convex on the side farthest from you, so that the basket will stand firmly on the outer edge of base.

When the base measures 4 in. across, gradually curve the cane until it rests on the previous coil at an angle of 45° , in order to start building up the sides of basket. Now cut a cardboard template to govern the shape of the basket as previously described. Continue working until the point is reached where the pattern is to be started. Measure the circumference of the last row round the basket with a narrow strip of paper and make a pencil mark on the paper to denote the size of circumference. Fold the paper into three equal parts. This will give you the actual size of the design to be repeated in each section. Draw the design on squared paper to the size required to fill one of the

sections, and use it as a basis for the other sections.

The design in the basket illustrated was worked with yellow raffia and edged with black. The black gives a bold outline to the pattern, and makes a sharp contrast with the body colour and natural background. Constant checking with the diagram will help you to make each section of the design well balanced with the others, and the continued use of the cardboard template is advisable for the shaping of the



FIG. 11
Fruit Basket

basket. The template can be discarded when the shoulder of the basket is reached, and at this point the coil should be gradually pressed inward until it reaches the correct angle. Continue reducing the diameter of the top of basket until the opening is of a suitable width, then make an upright neck consisting of five or six rows. To finish, taper the end of cane on the underside for about 1 in., then bind the end to the previous coil and make the last stitch secure.

The lid is commenced in the same way as the base with natural raffia, and the work is continued until the lid is exactly the same size as the top of the basket. Now work another row all round and then commence to make the collar which is to fit round the neck of the basket. This should, of course, be a good fit, not too loose or too tight, but what is called a clip fit. When the collar is deep enough, taper

off the end of cane and bind it to the previous coil.

A lifting ring should now be made. There are several ways of making and attaching a lifting ring. A small brass curtain ring, covered with raffia in buttonhole stitch, will answer the purpose, but the more practical method is to make a triple twisted cane ring and cover it with raffia tightly bound. Take a piece of thin cane about No. 3 size, 9 in. long, hold one end in the left hand and the other end in the right.

Take the right end over the cane and draw it through the loop, like-making a single tie or knot. Reduce the size of the ring until it is about 1 in. in diameter, then take the right-hand cane over and through the ring twice to make a two-ply ring. Now take the cane over and through three more times to make a three-ply ring. Cut off the surplus cane and bind the ring with raffia and make the end secure.

The ring may now be placed in the centre of the lid and secured with a few binding stitches taken through the lid and round the base of the ring. Make the ends secure and trim off any projecting ends of raffia.

Fruit Basket

IN LAZY SQUAW STITCH

Materials required—

- 3 lengths of No. 8 cane.
- 1 No. 17 Raffia needle.
- 1 lb. natural raffia.

First dip the cane in warm water to soften it, then with a sharp knife taper one end for about 2 in.

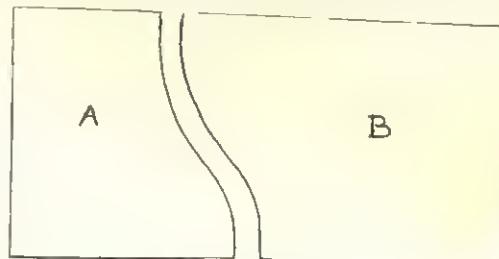


FIG. 12
Template for Fruit Basket

Start the coil in the usual way with a few strands of raffia as previously described, then

insert the tapered end of cane in the coil. Lazy Squaw stitch is used throughout. When the base measures 5 in. across, commence to build up the sides, using a cardboard template as illustrated. See that every stitch is pulled tightly, and make two wraps round the coil between the long stitches to make the stitches more distinct. The sides should be about $2\frac{1}{2}$ in. deep and the width at top of basket 9 in. Taper the final end of cane and bind to the previous row.

Oval Basket

BASKET WITH LID

Materials required—

2 lengths No. 8 cane.	2 oz. natural raffia.
1 oz. blue raffia.	1 blunt No. 17 needle.

This little basket is 6 in. long, 3 in. wide, and $2\frac{1}{2}$ in. deep. It is shown in the Colour Plate, facing p. 64.

Commence the oval base by making a hairpin bend 3 in. from one end of a length of No. 8 cane, and with a narrow strand of natural raffia weave in and out of the doubled cane, as shown in Fig. 13. Keep the two canes close together, so that the work will be firm. When the end of the 3 in. cane is reached, carefully bend the long cane over the end and commence to weave in Figure Eight stitch.

When the base is 6 in. long, gradually raise the coil and continue working until the cane rests on top of the last coil. Now make one complete row in natural raffia. A strand of blue should now be inserted. Make one Knot stitch over two coils, then wrap twice round the coil and make another Knot stitch. The coil should now be wrapped for $\frac{3}{8}$ in. before the next Knot stitch is made. This grouping of blue stitches and wrapping is repeated for one row. Insert a natural raffia and wrap the coil with this instead of blue, and make one Knot stitch between each pair of blue Knot stitches. Alternate rows are worked in this order, until the last row in natural is completed. Now work one row in Figure Eight stitch and taper the end of cane and bind it to the previous row (see Fig. 8).

The lid is commenced in the same way as the base, and, when a join in the cane is needed,

taper the cane for 1 in. on the underside and make a splice by inserting a tapered end of new cane (see Fig. 14).

When seven rows have been worked in natural raffia, work alternate rows in blue and natural to match the pattern in the sides of basket. The final two rows of lid should be commenced in blue when the lid is a good fit inside the basket. A collar consisting of two rows should now be made on the underside of lid in Figure



FIG. 13

Commencement of Oval Base

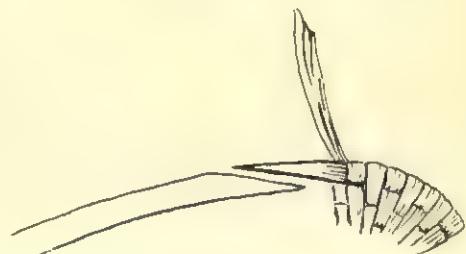


FIG. 14

Splice of Cane Coil

Eight stitch, to make a clip fit inside top of basket when the lid is in position. Make and attach a lifting ring as described in the Round Lidded Basket.

A Woven Raffia Bag

WORK ON A CARDBOARD LOOM

Raffia weaving on cardboard looms should not be regarded as being merely suitable for Juniors. Many delightful patterns and colour schemes can be carried out in the making of Bags, Pochettes, Tea Cosies, and Slippers. The work forms a good introduction to weaving on table looms with other materials. Of the many varied shapes suitable for bags, a Pouch shape has been chosen for our example.

Materials required—

A piece of cardboard large enough for the size of bag.
2 brass rings, $\frac{1}{4}$ in. in diameter.
 $\frac{1}{2}$ lb. of coloured raffia in assorted shades.
One 5 in. raffia needle and a smaller sharp-pointed needle.

TO MAKE THE SHAPE. Fold a piece of stiff paper down the centre then cut out the shape with scissors; any little adjustment can be effected to improve the shape when the paper is opened out. Lay the paper flat on the loom cardboard, and mark the outline with a pencil. Divide the line with dots about $\frac{3}{8}$ in. or $\frac{1}{2}$ in. apart as shown in Fig. 15. Now sew one ring

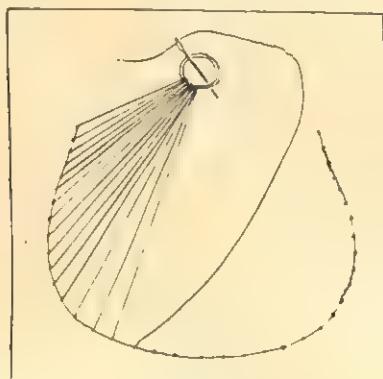


FIG. 15
Making the Foundation

on each side of the loom in a central position about $1\frac{1}{2}$ in. above the level of the first holes. The dots should now be pierced with a sharp needle or stiletto.

MAKING FOUNDATION STRANDS. Thread one end of an orange-coloured raffia in a No. 17 tapestry needle and tie the other end to one of the rings. Pass the needle through the first hole and, before drawing the raffia through, twist it a few times. This will facilitate the weaving, and add more strength to the strand. When the strand is pulled fairly tight, pass the needle through the ring on the other side of loom, and then insert it in the second hole and twist the raffia. Pass the needle through the first ring and then through the third hole. Continue to fill each hole with a strand as shown in Fig. 15, then tie the finishing end to the ring.

TO COMMENCE THE WEAVING. Thread a 5 in. raffia needle with a strand of brown raffia and

weave one row over each upper strand and under each lower strand. Pull the weaving strand tightly down towards the ring, by combing it with the point of the needle. Now turn round the outside strand and weave a row in the opposite direction to make a tabby weave, i.e. over one and under one foundation strand. When the row is complete, comb it down close to the previous row. Do this in every row, and be careful not to disturb the line of the outside strands which form the top edge of the bag. When the weaving is 1 in. in depth, cut off the weaving strand. Now thread one end of a primrose-coloured raffia strand in one needle and thread the other end in a second needle, in order to introduce a different weave. Pass half the length of raffia under the first foundation strand on the left side of bag, then weave one stroke with the left-hand needle and then one stroke with the other needle. A slanting stitch should now be showing on each of the first two strands. Continue to use each needle in turn until the row is complete. Weave a similar row from right to left: the two rows should form a bold unbroken line of colour. Weave two or three ordinary stitches and cut off the surplus ends.

The needle should now be threaded with royal blue raffia. Hide the last two or three primrose stitches with the first two or three strokes made with the blue raffia, and after one row is worked bring the raffia over the two outside strands and weave a second row on the same strands as in the previous row, to form a broader line of colour. Now weave an ordinary row over the alternate strands and make this into a double row by weaving from right to left over the same strands. Complete the decorative band with two rows of primrose raffia, using two needles alternately as before. The band should be semi-circular in shape and well balanced.

Before proceeding to weave the plain portion of bag, it is advisable to turn the loom over and weave a replica of the first side, using the same colours. From then onward, orange-coloured raffia is used; when the first hole is reached, the line of work should be built up by arranging that each succeeding row is worked over 4 strands less than in each previous row. One full row may then be worked before the worker

commences to build up again with shortened rows.

Turn the loom over and work a corresponding amount on that side of loom. Keep building up the line to make it more in keeping with the final shape of bag, but do not turn on the same strand on consecutive rows or else a hole will form. If the method of building up is continued until the desired amount is worked, no darning will be required to fill up holes round the sides of bag.

REMOVAL OF WORK FROM LOOM. Gently bend the card backwards and forwards to weaken it, then tear the outside card at the line of holes. Do not cut the card away with scissors, as you may cut through the foundation threads. Now bend the inside card and, after cutting

away the stitches which held the rings in place, withdraw the card from the bag. Trim off neatly all projecting ends in the weaving, and then cover the rings with buttonhole stitches in orange-coloured raffia.

THE PLAITED HANDLE

The plait is to be made with one group of 3 strands of royal-blue raffia and two groups of 3 strands of orange raffia. Tie the strands together at one end, and secure this end to the work-table. A three-way plait is made by bringing each outside group over the centre one in turn, first left, then right, at an angle of about 45° . As each stroke is made, slide the hand along the free strands to prevent the ends from becoming ravelled. The plait must be firm and even in width for a length of 1 yd. Should extra strands be required to build up the thickness, these may be laid on top of the group of three and then plaited in with the group in the usual way.

Double the plait in the middle and push the loop



FIG. 16

Shopping Bag, Pochette worked on Canvas, and Woven Raffia Bag

through one of the rings from the outside, then tuck the two ends under the loop so that when pulled up taut the loop is lying across the two plaits near the ring. The two plaits are to be sewn together with a narrow strand of orange raffia; but before commencing to sew, arrange for each of the inside blue strokes to meet in a level line to form an interesting pattern. The handle should be about 12 in. long from ring to ring.

To attach the ends of plait to the other ring, pass one plait through the ring from the outside, take it over the double plait and bring the end through the ring from the inside, and then tuck it in under the loop on top of the other end of plait. These two plaits must now be tightly sewn together and the ends cut off neatly under the loop.

The bag may be lined if desired, with silk, sateen, or other suitable material.

Shopping Bag

Materials required—

- 1 piece of single thread canvas, 24 in. × 13 in.
- 1 piece of raffia fabric, for lining.
- 2 pieces of thick cord 14 in. long, for handles.
- ½ lb. raffia in selected shades.
- 1 blunt No. 17 Tapestry needle.

First decide upon the size and shape of bag. The one illustrated measures 12 in. wide and

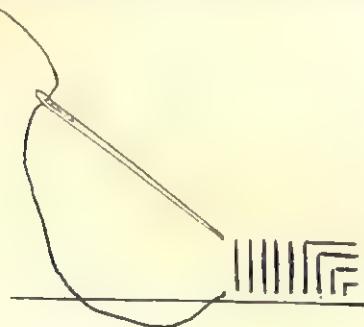


FIG. 17

How the Blue Border is Made

11 in. deep. If a more roomy bag is required, a gusset 1½ in. wide round the three sides may be arranged for by having wider canvas. Before commencing the actual raffia work, draw the motif of the design on squared paper, regarding each square as the width of a raffia stitch. The repetition of a simple geometrical form, such as a square, oblong, triangle, or diamond shape, will produce pleasing and satisfactory results if combined with suitable blending or contrasting of colours in the carrying out of the design.

In the bag illustrated (Fig. 16), the two large panels are worked in oyster shade, bordered

with a deep shade of Wedgwood blue. The inner border line is in oyster shade. Blue is used for the diamond centres, framed with oyster shade. Jade green is used for the background of the centre and top panels.

There are several ways in which the work may be commenced. One of these is to draw the design on the actual canvas and then colour the various parts of the design according to the colours of the raffia to be used. This makes it necessary to be accurate in the spacing and counting of the canvas threads. Another way is to draw a few construction lines such as will govern the size of panels, and adapt the size of the design to fit; but to obviate the risk of making mistakes in the counting of the threads required, the following method is recommended.

First find the middle of the canvas and draw a line from end to end. This will ensure the design's being evenly balanced on each side of it.

Double back the end of canvas on the underside for about $\frac{1}{4}$ in. so that the turned-in edge will be buried by the stitches. Place the canvas flat on the work-table with the doubled end towards you, and slightly overhanging the edge of the table. The canvas may be kept in position by fixing it with two drawing-pins, or by putting a weighted object on it. If desired, the canvas may be stretched on an embroidery frame.

To commence the broad blue border at the top of bag, measure 5½ in. from the centre line and make a mark in pencil to denote where the border is to be started. Bring the needle, which has been previously threaded with blue raffia, up through the hole in canvas at the mark. Leave about 6 in. of the raffia free, to be used later in the mitring of the corner. Make a satin stitch passing over four threads which comprise the second, third, fourth, and fifth horizontal threads; the first thread is left bare, to be covered later by the narrow bordered edge. As each stitch is gently pulled through, flatten it with a little pressure of the left thumb. Continue for 11 in. to make a band of satin stitches over four threads along the top of bag (Fig. 17).

The stitches must not be slack, or so tight as to disturb the canvas threads. To make a join, draw the end under several stitches on the underside, and insert the new end in a similar way. A knot neatly made on the underside would

serve. The next row is worked with raffia in oyster shade, inslanting stitches taken over two canvas threads. Do not worry about the exact length of this row, as the corners can be adjusted later when the diamond pattern is worked. Take a strand of jade raffia and, starting on the pencilled line in the middle, make the longest

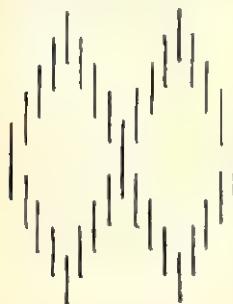


FIG. 18
*The Outline of
 Diamond Shapes*

group. Complete the other end of row with a similar stitch to balance. This row determines the inside width between the side borders, and from this point a mitred corner should be made with shortened stitches, as shown in Fig. 17. Continue with a strand of blue raffia to make the side borders to match the top one, for a short distance, then work the frame or outline of the diamonds in oyster shade (Fig. 18), each stitch starting from one of the side borders. The first stitch passes over 6 threads and is brought up under 8 threads so that the stitch butts against the second green stitch. All the stitches from now onwards are taken over 4 threads, excepting where the diamonds touch each other: the connecting stitch is taken over 6 threads. Refer to the drawing on squared paper.

Fill in the centres next with blue raffia, and then work a row of inverted triangles in jade. A row of slanting stitches in oyster shade is next to be worked as far as angle. Carefully mark the point where the row is to terminate in the horizontal before continuing at right angles up the side of the centre panel.

Extend the borders to the depth of bag, then work the centre panel in colours to match the top border. Fill in the two large panels with background stitches, as shown in Fig. 19. The first stitch is taken over 8 threads and the second

stitch is taken over 4, making 1 long stitch and 1 short one. Repeat these stitches for one row then bring the needle out at the short stitch and make a row of long stitches with one space between each stitch which will be covered by the stitches in the next row. No short stitches need be made now until the final row.

One row of slanting stitches in blue raffia is worked along the base of bag and the other half of the bag is to be a replica of the first half.

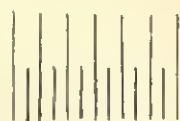


FIG. 19
Background Stitches

To Fix the Handles

FIG. 19
Background Stitches

First sew the ends of the cord to the canvas with strong thread, to make secure, in line with the fourth diamond from each side; then bind the handles with blue raffia. The wrapping must be very tightly done; and if two coverings are made a better result will be produced.

LINING THE BAG

Lay the work face downward on the table and trim off any projecting ends of raffia. Place the raffia cloth in position and, after turning in the edges, neatly sew the lining to the canvas with thread. The work should now be folded across the middle and the two sides sewn together with blue raffia—use short stitches, passing over one thread of each half of the bag. The lining may be secured across the top of bag with oversewing in blue raffia instead of with thread.

The finished article will look more attractive if the work is pressed under a cloth with a warm iron. Any hairy fibres may be removed by carefully singeing with a spirit flame.

Pochette

Materials required—

- 1 piece of single-thread canvas, 18 in. x 9 in.
- 1 piece of material for lining, e.g. Rabanne or sateen.
- 2 oz. raffia in assorted shades.
- 1 Raffia needle, No. 17, blunt.

Fold the edge of canvas under at one end for about $\frac{1}{4}$ in. in depth and press the crease quite flat. Now make the broad border along the base of flap with nut-brown raffia, using diagonal stitches. Each stitch should pass over the second, third, and fourth horizontal threads and cross over three of the upright threads. Arrange for the first horizontal thread to be left uncovered, as this will be covered later with the final edging in raffia (Fig. 21).

Between the inner edges of the side borders, you must allow for 77 holes for the working of the diamond shapes which fill the panel. 31 holes

are required for the length of the diamond shapes from tip to tip, in the depth of the panel; but before commencing to work the diamonds, continue the border in diagonal stitches all round the four sides of pochette, allowing $5\frac{1}{4}$ in. for the depth of the pocket.

BUILDING UP THE PATTERN. The dark centre of each diamond consists of 3 satin stitches worked in dark-brown raffia. The centre stitch passes over 8 horizontal threads, and the stitch on each side of the centre one passes over 2 threads. These 3 stitches are then surrounded

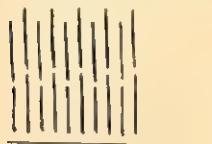


FIG. 20

Background
Stitches

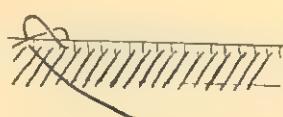


FIG. 21

The Start of Plaited
Edge

with stitches in nut-brown raffia; the 3 lower and the 3 top ones pass over 6 canvas threads, and the side ones are the same in size as the dark centre stitches, to complete the diamond shape. The light-coloured outline is to be worked in beige or cream raffia, each stitch passing over 5 canvas threads, excepting the longer stitch which connects the diamonds: this stitch is taken over 6 threads. As each stitch is made, gently press it into position with the left thumb. The outside edges of the large diamonds are to be worked with dark brown, and each of the final spaces is filled with 3 stitches in orange.

Now work one row of diagonal stitches along the top points of the diamonds to form a border in dark brown, each stitch passing over 2 threads. One row of pyramid shapes must now be worked in nut-brown raffia. Start in the very centre and take the first stitch over 1 thread, the second over 2, the third over 3, and the longest over 4. Reduce the length of the stitches in the half of the pyramid to make the sides balance. When the row is finished, make a row of inverted pyramids in nut-brown to form the top edge of the long panel. Four horizontal threads should be left clear along the centre between the inner ends of the longest stitches. Now connect the longest stitches of the two

rows of pyramids by making a satin stitch over 4 horizontal threads. On each side of these stitches make a stitch in dark brown, passing over 6 threads, and then make a dark-brown stitch between each pyramid, passing over 3 threads. Fill in the remaining spaces with orange raffia stitches in groups of five, each stitch passing over 4 threads. One row of pyramids should now be worked in dark brown, and one row of inverted pyramids in nut brown, the same size as previously worked. To complete the pattern make one row of diagonal stitches passing over 2 threads in dark brown.

Fill in the remainder of the vacant panel with background stitches in beige or cream raffia. In the first row the odd-numbered stitches will pass over 5 threads, and the alternate stitches will be taken over 6 threads. After this row, all the stitches will pass over 6 threads but the alternate stitches will be one thread higher or lower as the case may be (Fig. 20). Joins in the raffia should be neatly made on the underside, either by knotting or drawing the ends under a few stitches to secure. Trim off any projecting ends when the panel is filled.

MAKING UP THE POCHETTE. The outer edges may be made to look very interesting, if the stitches are arranged to produce a plaited effect. First fold the canvas to form a pocket $5\frac{1}{4}$ in. deep; then, with nut-brown raffia, commence at the base of pocket and draw the needle through the first hole from the back, take it over the two thicknesses of canvas to the far side and bring the needle through the fifth hole. Gently pull the stitch fairly tight, then take the raffia over from right to left and bring the needle through the second hole (see Fig. 21). Repeat these movements, advancing forward one hole as each stitch is made. Be careful not to miss a hole, as this causes the length of stitch to be shortened, and such defect must be remedied. The beginning end of raffia should be buried by the succeeding stitches in order to secure it. After two or three stitches are made, the plaited effect of the border will be seen. Continue in this way all round the edges of the pochette and make the final stitch secure.

LINING

This may be done as described on page 73.

CANE BASKETRY

Introduction

THE educational value of Basketry as a handwork subject is now being fully recognized. The craft is suitable for boys and girls in the Senior School. Although one of the oldest of the constructive crafts, it has fortunately escaped from the reach of machinery, and to-day maintains its position as a true handicraft. Its exponents will find plenty of scope for creativeness in design in the making of useful and attractive articles. The outlay covering cost of tools and equipment is small; and, if the craft is learnt in easy stages, the work will be found to be full of interest. The use of a sloping workboard, shown in Fig. 6, p. 77, will greatly facilitate the weaving in the sides of baskets and is strongly recommended. One set of tools costing about 8s. 6d. is sufficient for a group of six pupils. Pulp cane, which has been chosen for the making of the articles described, costs from 2s. 6d. to 3s. 9d. per lb., according to size and quality. It is economical in use and may be easily dyed with ordinary household dyes for the introduction of pattern and colour.

Cane should be dipped in water, then taken out and laid aside for fifteen minutes to drain. It will then be in a suitable condition for working. Do not use cane when it is very wet or very dry. It may be damped as often as necessary, but damp cane must not be stored away until it has been dried, or it will become discoloured.

Cane should never be left in water indefinitely, or it becomes waterlogged. Fifteen minutes is the maximum time for even the thickest cane.

Basketry Terms

FOUNDATION CANES OR BOTTOM STICKS

Four canes inserted through the slots of four other canes in the form of a cross on which a woven cane base is worked. Each group of four is bound together for two rows

with the weaving canes, then opened out into twos; after four rows are worked over and under the pairs, the latter are parted into singles, and the weaving continues over and under single canes until the base is fully woven. The foundation canes are then cut off close to the outer edge of base. The weave known as pairing is most suitable for the weaving of round bases, but for oval bases randing is better, as pairing tends to cause the base to twist out of shape. Foundation canes should be thicker than the side stakes.

STAKES

These are the main canes or ribs which form the skeleton of the basket. They are inserted in the base on each side of the bottom sticks and terminate in the border at the top of basket. Stakes should be of cane a few sizes thicker than the weaving cane.

BY STAKES

Auxiliary stakes inserted alongside the original stakes and then parted in order to reduce the width of the space between the stakes, to give added strength or closer weave when the stakes otherwise would be too wide apart to be practical in the base, sides, or lid of basket.

LINERS

In the case where the stakes are not strong enough an extra stake is inserted by the side of each, and the two canes are carried up as a double stake. These additional stakes are called Liners. In rectangular-shaped baskets usually the corner stakes only are strengthened with liners.

RANDING

This is the very simplest of weaves. A single cane is inserted between two stakes and is woven in front of one and behind one and so on. When a join is necessary, the finishing end is left inside and the new end is inserted in the space where the old end would have come out. When there

is an even number of stakes, it is necessary to employ a second weaving cane. The first row is woven with one cane, then the second cane is inserted in the space which is to the left of the first space. The second row is woven with the second cane and the third row with the first cane. The canes should not pass each other and the leading cane should always be worked until it

is more suitable for the making of round bases and lids. To join a new cane, leave the old end projecting outward and insert the new cane on the left side of the old end.

UPSETTING AND WALING

Usually three single canes are worked each in their turn in front of two stakes and behind one,

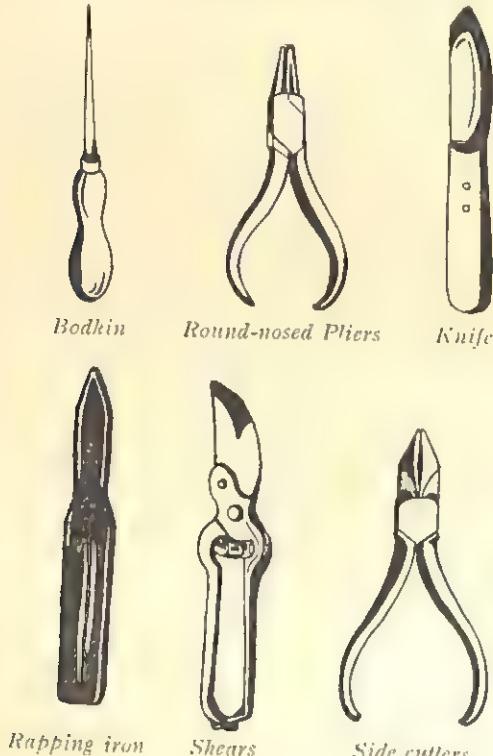


FIG. 1
Tools for Cane Basketry

nearly reaches the other, one row being woven with one cane and the next row with the other cane. When an odd number of stakes is used the second cane is unnecessary. Randing is usually employed in weaving the sides of baskets.

PAIRING

This is a variation of randing, working with two single canes and taking each alternately in front of one stake and behind one. Always take the cane which is on the left to begin with. Pairing should not be used in the sides of baskets.

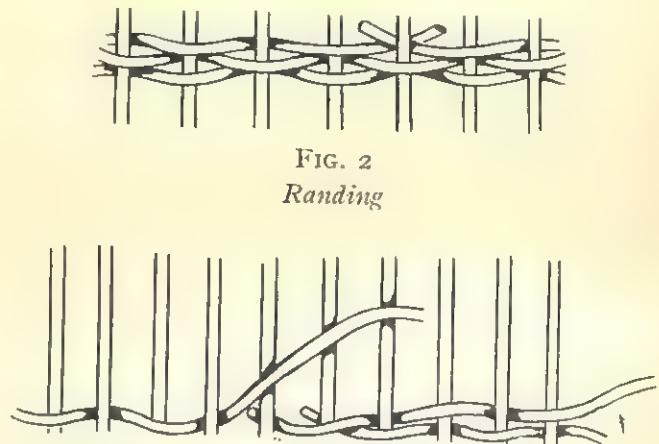


FIG. 2
Randing

FIG. 3
Inserting Second Weaving Cane when
Stakes are Even in Number

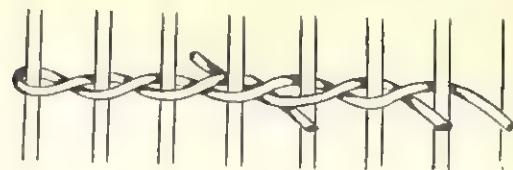


FIG. 4
Pairing

starting with the cane which is on the left of the other two. The first cane is placed between the first and second stakes, the second cane between the second and third stakes, and the third cane between the third and fourth stakes. Starting with the first cane, take it over the other two and in front of two stakes, then bring it out behind one stake and leave the cane projecting parallel with the other two. The movements are then repeated with each cane in turn. When a join is necessary, leave the finishing end outside and tuck the end of the new cane alongside on the right of the finishing end, one end being

outside and one inside. When the weave is being finished, the ends may be left inside or drawn through the last row under two canes.

The variation of upsetting and waling is made by using four canes each passing in front of three stakes and behind one, or in front of two and behind two stakes. Upsetting means the setting up, but waling is used to strengthen the sides and top of the basket.

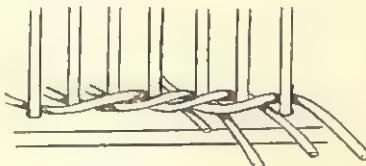


FIG. 5
Upsetting

CABLE OR CHAIN WALING

This consists of one row of ordinary three-rod waling, but in the second row each cane is taken under the other two instead of over.

SLEWING

This is a variation of randing, and is worked in exactly the same way as randing but with two or more canes being used simultaneously to form a broader band of weaving on each row. Only cane thinner than that used for randing should be used in slewing, otherwise the stakes would not withstand the pressure of the strong weaving canes. Joins are effected in the same way as in randing. When starting to slew, insert one cane and take one stroke with it, then where the first stroke finished insert the end of the second cane and continue to weave with the two canes. This gives a more gradual rise for the second row. Finish off the canes one before the other, rather than finish both off at the same spot, in order to level off the line of weaving. It is advisable to have an uneven number of stakes when weaving is to be in the form of slewing, as two sets would be more difficult to manage.

FITCHING

In baskets with open-work sides the stakes are usually crossed in the form of a lattice and held in position with a "fitch" or band of

fitching. Two fitch canes are used alternately, somewhat as in pairing, but the left cane is taken under the right one instead of over as in pairing. This gives a tighter binding than pairing. Joins are made in the same way as in pairing.

WASH AND SINGE

If the work has become soiled during the process of making, it may be scrubbed with a small



FIG. 6
Position of Hands when Weaving Cane
The model being made is the shopping basket shown in Fig. 15.

nail brush and clean warm water. No soap should be used. When the basket is quite dry, all the hairy fibres of the cane should be removed with a Bunsen gas flame or a spirit flame. Carefully see that the basket is kept moving over the flame to prevent scorching. The singeing will improve the appearance of the finished article.

THE FIRST STAGES

Much useful knowledge may be gained in the preliminary lessons, if the work is confined to the first essentials of the Art of Basket-making. Demonstrations should be given in the following : Preparation of material.

Suitability of material.

Correct position of the hands while the weaving is in progress.

Simple weaves and borders.

Methods of joining employed in Randing, Pairing, Upsetting, and Waling.

The importance of regulating the positions of the stakes and the correct shaping of the sides of basket.

The choice of the most suitable model for the first lesson is an important matter. The model selected should be simple in design and not too small in size. The shape should be straightforward and the weaving simple. Facility in weaving should have been attained by the pupils before they are asked to turn their attention to the shaping of baskets; for the shaping is of vital importance to these more advanced projects, and demands concentration which can only be given to this factor after familiarity with the weaving has been acquired.

For the first stages, then, very suitable models are a small oval tray and a crustless-cheese basket, especially if the pupils have had no previous experience in basket-making. Read carefully the detailed descriptions of the various weaves on pages 75-77 to ensure that the work is being done in the correct way.

Small Oval Tray

Materials Required—

Thin plywood base, 8 in. by 5 in., bored.

29 stakes, No. 4 cane, 5 in. long.

1 length of No. 1 or No. 2 cane, for weaving.

First dip the cane in water and lay it aside to drain for 15 min. Cut 29 stakes, 5 in. long, of No. 4 cane. Insert a stake in each hole of the base and leave one end of each stake projecting 2 in. on the underside of the base. Place the tray on its side with the long ends of stakes pointing towards you. To commence the foot border, and working from left to right, bend down the first stake over the near side of the second, and leave the end behind the third stake. Make a similar advancing movement with each stake in turn, and finally tuck the last end under the loop formed by the first stake. This is called a Trac border.

Stand the tray flat on the work table and see

that the sides are not caving inward. Press the stakes outward a little. To commence the weaving called Randing, take a single cane of No. 1 or No. 2 size and insert the end in the space to the left of the first stake. Now weave in and out of the spaces, passing in front of one stake and behind one, and so on until about ten rows are worked. The weaving cane should be held in the same way as a pen is held for writing. If a join is needed, leave the finishing end inside and place the new end in the space where the old end would have come out.

The final row should be worked with two canes in the form of Pairing. Insert the second cane in the space to the right of the space where the Randing cane projects; commencing with the Randing cane, take one stroke in the usual way, then one stroke with the second cane. Continue to use the canes alternately; and to finish, draw the final end through from the inside under the row of pairing.

Sharpen the ends of stakes 2 in. above the line of work. Bend down the first stake in the form of an arch and insert the end down by the near side of the third stake, passing in front of the second stake. The loop should be a half-circle in shape. Treat all stakes in a similar way to complete the pattern of border.

Carefully trim off all ends to neaten.

Crustless-Cheese Basket

Materials Required—

Round wood base 5½ in. diameter bored.

25 stakes, 8 in. long, of No. 3 cane.

3 lengths of No. 1 cane, for weaving.

1 piece of No. 12 cane, for handle.

In the making of this attractive model, the weaves known as Upsetting and Waling are introduced; also a simple type of handle.

Insert the stakes in the holes of the base with the ends projecting 3 in. on the underside, for the working of the Trac foot border as described, for the Oblong Tray, on page 82 (see Figs. 13, 15). When the foot border is complete, stand the work flat on the table and press the stakes outward slightly, to prevent the sides from being drawn inward when the weaving is being done.

For the row of Upsetting, three No. 1 canes,



FIG. 7
Crustless-cheese Basket and Small Tray



FIG. 8
Teapot Stands
Examples of simple introductory projects, for practice in different borders.¹

17 in. long, will be needed. Place the end of one cane in the space to the left of the first stake, and then place the second cane to the left of the second stake, and the third cane to the left of the third stake. Commencing with the cane which is on the left of the other two, take it in front of two stakes and bring it out behind one stake. Repeat the movement with the cane which now happens to be on the left of the other two; and then with the third cane, which is now on the left. Continue weaving the canes in this order for one row, and draw each finishing-end through from the inside and alongside the beginning ends (see Fig. 5). Now weave eight rows of Randing with a single cane; be sure to keep the sides of basket upright, to ensure a good fit of the cheese box. Work one row of Waling in the same way as in Upsetting. The pattern of the top border is like the foot border and is worked in the same way.

For the handle, make a point on each end of the No. 12 cane and insert an end down by the side of a stake. The other end should be inserted by a stake on the opposite side of basket. Cut a piece of No. 1 cane, 4 ft. long, and pass half through the side under the Waling on the left side of handle. Twine the cane round the handle, making the wraps 1 in. apart. Tuck the end under the Waling on the left side of handle and weave it away for two strokes to the right. Twine the other half of cane midway between the previous wraps and weave the end away towards the left. (See Fig. 10.)

Cut off all ends neatly.



Binding the handle. The start.

Work Basket

Materials Required—

- 1 round 7 in. base, bored.
- 29 pieces No. 6 cane, 12 in. long.
- 29 pieces No. 6 cane, 6 in. long.
- 3 oz. No. 3 cane for weaving.

This useful model serves admirably for those who have not previously had very much basketry experience. The weaves are simple and the borders should not prove to be difficult. Careful attention should be given to the shaping of the stakes in the sides of the basket to produce the desired result.

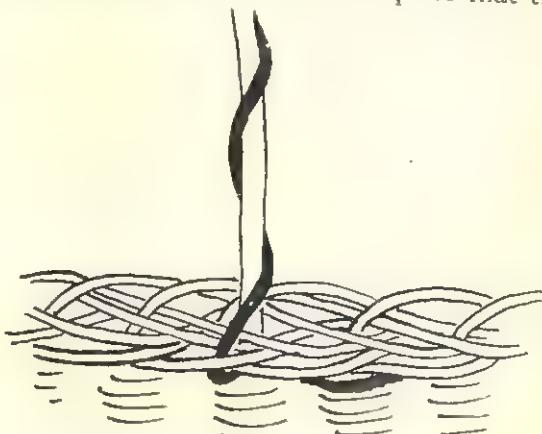
Trac Foot Border. When the cane has been dipped in water, insert a 12 in. stake in each hole



FIG. 9

Work Basket : Trac Foot Border

of the base and allow the cane ends to project $2\frac{1}{2}$ in. on the underside of base. Place the work on its side with the short ends pointing away from you; then, working from left to right, bend down the first stake in front of the second and third and leave the end behind the fourth stake (see Fig. 9). Repeat the movements with each stake in turn. To finish neatly, tuck the final stakes in under the first loops so that the



Showing the finish of first binding cane.

FIG. 10
Handle of Cheese Basket

pattern of border is continuous. See that the border fits closely to the base, then stand the work upright and curve outward all stakes from the base before commencing to weave.

Upsetting and Waling. Three rows of upsetting are to be worked. Take three No. 3 canes and insert one end between the first and second stakes; the second cane should now be inserted



FIG. 11
Work Basket and Cutlery Basket

in the next space to the right and the third cane in the next space to the previous one. Using the cane on the left to begin with, take each cane in turn over the other two, in front of two stakes and behind one stake, the cane being left projecting outside parallel with the others. Always use the cane which happens to be on the left of the other two. When three rows are complete, cut off two of the canes and then rand with the single cane in front of one stake and behind one, and so on for a depth of 3 in. To effect a join, leave the finishing end inside and insert the new end in the space where the old one should have come out had it been long enough.

Two rows of waling are to be now woven in exactly the same way as upsetting. Re-damp the stakes and then insert a short cane of No. 6 size down the right-hand side of each stake to a depth of 1 in.

The Border. To commence the border, grip the first double stake between the thumb and finger of the left hand and bend it down sharply behind the second stake with the right hand, making a loop about $\frac{3}{4}$ in. above the waling, then take the double cane in front of two double stakes and leave the ends inside (see Fig. 12). Continue repeating the same movement with each double stake in turn, always keeping the main stakes on top of the auxiliary ones. As each stroke is taken, press the canes close to the canes previously worked to prevent gaps from forming. Thread the final canes through the border in their respective positions to complete.

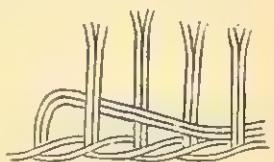


FIG. 12
Beginning the Border for Work Basket

Oblong Tray with Plaited Border

Materials Required—

- 1 plywood base, bored.
- 4 oz. No. 5 cane for stakes.
- 2 oz. No. 3 cane for weaving.
- 5 pieces of No. 5 cane, 12 in. long, and 3 pieces 3 in. long.
- 12 oval and 4 round beads. (See Fig. 15.)

A very useful size for a tray is 20 in. \times 12 in., which takes a breakfast set, but if a larger size is required you will find that a tray measuring 21 in. \times 15 in. is the most suitable for general use. An oak base will be more serviceable and attractive if a coating of french polish is applied to the surface with a pad of cotton-wool or soft cotton rag. Oak should not be highly finished by repeated applications of rubbing. What is known as an eggshell finish is best, and is produced by two coatings of polish.

The tray illustrated has a birch plywood base decorated with conventional floral design in blue and green. A very interesting result may be obtained by stick printing or rubber stamping. A simple motif, say of a flower and leaf, is cut

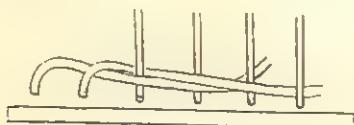


FIG. 13

The Tray : Beginning Trac Foot Border

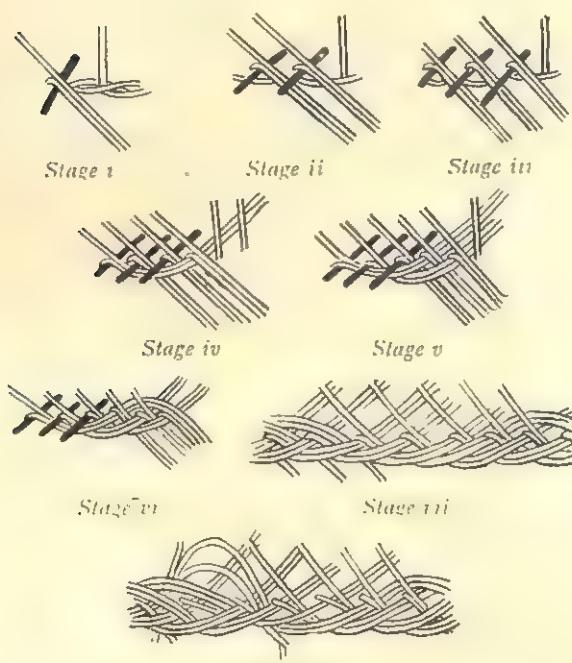


FIG. 14

Two-rod Five-stroke Plait Border

out of thin rubber and mounted with glue on the end of a small piece of wood, then dipped in stencil paint or oil colour and applied to the tray base to form a border design. Simple geometrical shapes serve equally well.

When this is dry, apply a coat of cellulose transparent finish which is heat proof, thus protecting the colours.

To commence the canework, first wet the cane and lay it aside for a few minutes. When

it is ready for use, cut the stakes 16 in. long from No. 5 cane and insert a stake in each hole, one end projecting $3\frac{1}{2}$ in. for weaving the foot ridge. After the stakes are inserted, stand the tray on its side edge with the short ends of stakes pointing away from you; working from left to right, take one stake and bend it down behind the next, then in front of two, and leave the end at the back of the fifth stake. This is called a Trac foot border (see Fig. 13). Repeat the movements with each stake in turn and draw the final stake under the first loop, and then tuck the end in the vacant space between the third and fourth stakes. Now stand the tray flat on the work table and press the corner stakes outward a little, as the tendency will be for the corners to cave inward while the weaving is in progress.

Take three canes of No. 3 size and weave two rows of upsetting before threading the beads on the centre stakes at each end of tray.

When the end stakes are uneven in number, five oval beads should be used in the centre with a round bead on each side of the group, to make the rise of the handle more gradual. If an even number, place six oval beads in position with a round one on each side of the group.

Continue the weaving of the upsetting over the top of the beads and round the tray until four rows are completed in all. The tray is now ready for the border.

Re-damp the stakes if necessary and then bruise each stake with round-nosed pliers to prevent breakages, resting the pliers on the top of the upsetting. Have the five auxiliary canes and three short ones in readiness for starting the Two-rod Five-stroke Plaited Border.

Place a short cane between the first and second stakes and pull down the first stake over the short cane at right angles, then place one of the 12-in. canes alongside the turned-down stake to produce the form of a cross (see Fig. 14, Stage i). Place the second short piece of cane between the second and third stakes and on the top of the turned down canes, then pull down the second stake and place the second 12-in. cane alongside it (see Stage ii). Repeat the movements with the remaining short cane, third stake, and third auxiliary cane (see Stage iii). Refer to these diagrams to check the positions. Now place

the left thumb under the left-hand pair of canes, and with the right hand take this pair through the first two upstanding stakes and leave the pair inside; then pull down the first upstanding stake over the pair, and place the fourth auxiliary cane alongside (Fig. 14, iv). Now take

left thumb, then bring the left-hand pair of canes from the inside alongside the last turned-down stake (Fig. 14, vi). Repeat the movements with the next group; then, when you find that three sets of three canes are projecting outward, only take the two outside canes, the innermost



FIG. 15

Shopping Basket, Waste-paper Basket, and Tray with Plaited Border

the pair of canes (which are on the extreme left) through the next space and pull down the first upstanding stake, and place the remaining 12-in. cane alongside (Fig. 14, v). The border is now to be worked to the following formula. Place left thumb under the left outside pair of canes, take them through the first two upright stakes to the inside, pull down the upright stake with the

cane remaining to be cut off later. This applies to all the innermost canes throughout the border. When the final stake is brought down and the two inner ones are laid alongside it, trap these three canes under the end of the first cane peg.

To finish the border, tuck the left-hand pair of canes through the border exactly where the first peg is, then remove the peg. Tuck the next

pair through alongside the next peg and remove the latter, then insert the final pair alongside the third peg and then remove the peg (Fig. 14, vii). See that the canes are level on the outside edge of border, then lift the five single cane ends on top of the five double canes inside the tray. With the left hand pull the left pair of canes more to the left and insert the nearest single cane end in the opening made under the border. Repeat the movement with each pair and each single cane, then, working from left to right, insert the longer cane of each pair alongside each single cane to complete the border (Fig. 14, viii). There should be five ends projecting to the right inside the tray and five ends projecting outside to the left, all under the border if worked correctly. Now cut off all ends close to the plait to neaten. When cutting off the ends on the underside of base, leave sufficient to rest securely against the inside of each stake.

Cutlery Basket

Materials Required—

- 1 wood base, 16 in. × 9 in., bored.
- 1 wooden handle partition.
- 1 short wooden partition.
- 62 No. 6 canes, 12 in. long.
- 8 pieces of No. 6 cane, 3 in. long.
- ½ lb. No. 3 cane. (See Fig. 11.)

This useful basket is made in exactly the same way as the oblong tray, the sides of course being deeper. The work should not prove difficult, and a good result will be obtained if care is taken in keeping the corner stakes upright and not allowing them to cave inward. Attention must be paid to the stakes which are next to the corners. Keep these stakes in line with the others and do not let them bulge outward to spoil the shape.

To commence, insert the stakes in the holes of the base leaving $3\frac{1}{2}$ in. projecting with which to work the foot border as described in making the tray (see Fig. 13). When the border is finished, turn the work right side uppermost and weave two rows of upsetting. Insert one of the short No. 6 canes by the side of each of the corner stakes, to give strength. The body of the basket is now to be randed to a depth of $2\frac{1}{4}$ in. inside the basket. Add one row of waling, then tap the

line of work down level on all sides of the basket. Cut off the ends of the short canes at the corners and bruise all stakes before commencing to weave a Three-rod Plain Border as described in the making of waste-paper basket (see Fig. 19).

Now cut off all ends and place the wood partitions in position inside the basket, then choose a soft-natured natural cane of No. 3 size, and cut off a piece 10 in. long. Pass one end through the centre of end of basket alongside the small hole in big partition. The cane should now be taken through the hole and through the canework under the top waling, one part of the cane being on the left of the centre stake and one on the right of it. Take the cane once more through the hole, then weave the two ends away in opposite directions to make secure. Fasten the other end of partition in the same way and also secure the ends of the short partition. Should a good fit not result, two small screws through the base into the partitions will remedy the defect.

Waste-paper Basket

Materials Required—

- 8 pieces of No. 12 cane, 9 in. long.
- 32 pieces of No. 8 cane, 19 in. long.
- 32 pieces of No. 8 cane, 12 in. long.
- 64 pieces of No. 4 cane, 12 in. long.
- ½ lb. No. 3 cane for weaving.

Make an incision in the centre of one of the No. 12 canes and insert a solid cane through the slot to form a cross. Now make an incision in each of the three canes and thread them on the solid cane alongside the first split cane. It will be quite easy now to pass the remaining three solid canes through the slots to form a cross showing four canes each way (see Fig. 16).

Choose a very soft cane of No. 3 size, double it in the centre, and place the loop over one of the groups of four, leaving the two long ends hanging on the side nearest to you. Take the left-hand cane over the right-hand cane and, passing over a group of four canes, bring the cane behind the next group and leave the cane hanging parallel with the other weaving cane. Now take the latter cane (which is now on the left) and pass in front of four canes and behind

four. This weave is called pairing. Continue weaving over four and under four for two rows, pulling the cane very tightly to bind the founda-

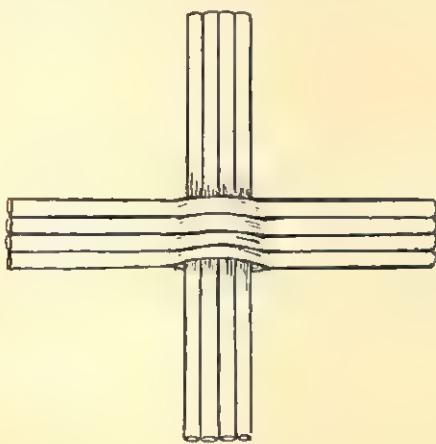


FIG. 16
Foundation Canes of Base

tion canes together. Then part the fours in the middle, left and right in twos (see Fig. 17), and continue pairing for four more rows over two and under two. The foundation canes should now be opened out into single canes, and the weaving continued over one and under one until the base measures 6 in. across. Be careful to make the base slightly arched, to ensure that the basket stands rigid on the outer edge of base.

When a join is necessary in pairing, leave the old end projecting on the near side and insert the end of the new cane on the left of the old one, one end being on one side of the base and the other end on the opposite side of the base. To finish off the weaving, draw each finishing end through from the back under two canes of the last row. Cut off all ends of weaving quite close, and also the ends of the foundation canes. Sharpen one end of each stake of No. 8 canes and, after dipping the points in water, insert a stake on each side of the foundation canes of the base. Bruise all stakes with pliers close to the base and then press them down at right angles towards the arched side of base. For the first row of upsetting, use four No. 3 canes. Insert the ends of each cane into the base and alongside each of the first four stakes for security. Hold

the basket upside down whilst one row of upsetting is being woven. Each cane must be taken over three stakes and under one. When the weaving cane rests alongside the first stroke of upsetting, cut off the cane and continue with the remaining three canes. As soon as the first row is completed, weave three rows of upsetting in front of two stakes and behind one with the three upsetting canes. To help in the shaping of the bowed side of the basket, a cane hoop placed round the stakes will be an advantage, especially if the basket is pinned to a sloping work-board whilst the weaving is being done. After the upsetting, commence to rand with a single cane in front of one stake, behind one, and so on for one row. Then, as there is an even number of stakes, it will be necessary to insert the end of a second weaving cane in the space which is on the left of the first space where the randing commenced (see Fig. 3). Alternate rows are worked with each cane, and care should be taken not to pass the leading cane: always work with the cane which happens to be leading. If an odd number of stakes had been

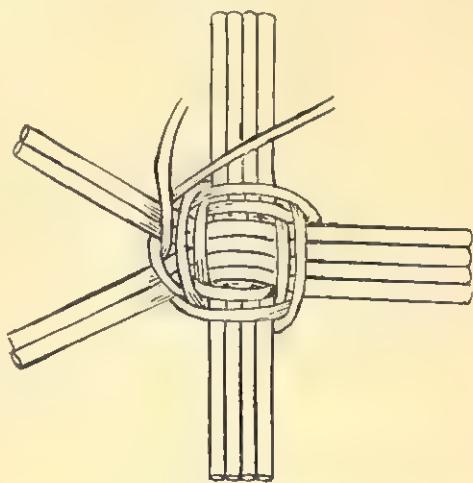


FIG. 17
Opening each Group in Pairs

arranged for, only one randing cane would have been required. Weave about 16 rows, then add 2 rows of waling with three canes in exactly the same way as upsetting. Cut off one of the waling canes, then start to weave 1 row of pairing with the two remaining canes. Draw the

finishing ends through from the inside to secure them.

Now take the sixty-four pieces of No. 4 cane

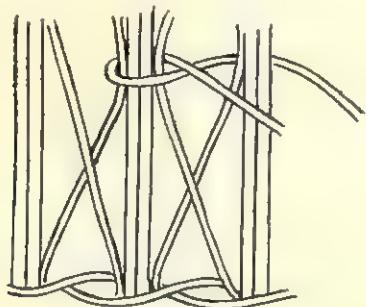
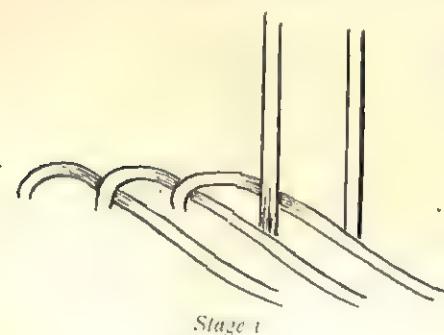


FIG. 18

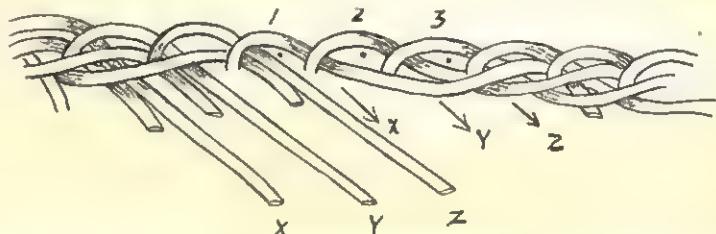
Fitching

and sharpen them at one end. Dip the points in water, then insert a cane down each side of the double stakes as far as the line of upsetting. You are now ready to start the fitching of the open work. Take a long pliable cane of No. 3 size,

double it in the centre, and loop it over the canes as shown in Fig. 18. With the right hand take hold of the left-hand cane, whilst holding the right-hand cane with the left hand, pass the left cane under the right one, and then make a cross between the pair of stakes by bringing one cane from the left of the stake and one from the right of the previous stake, the four canes being all caught together in the fitching $1\frac{1}{2}$ in. above the last row of weaving (see Fig. 18) before the next stroke is taken. Continue in this way and be careful to keep the line of fitching parallel with the last row of weaving. There will always be a tendency for the fitching to rise, and this must be checked. When the row is completed add a third cane to weave two rows of waling, the stakes being in groups of fours. Weave 4 in. of randing, then add two rows of waling and one row of pairing. Now the fitching is to be done in the top band of open work in the same way as the lower band. If desired, the second row of waling may be worked as a cable chain wale.



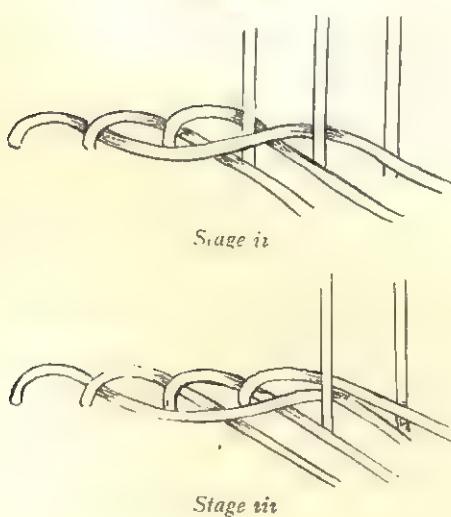
Stage i



Finishing the Border



Extension of the Border



Stage iii

FIG. 19
Three-rod Plain Border

To do this, take each waling cane under the other two instead of over as in the usual way, and a herring-bone effect is produced. Twelve rows of randing should now be worked on the stakes, which are now in groups of four again. Add three rows of waling, cut off all the extra cane alongside each stake, and leave only single stakes for the border.

Use the sloping work-board; it is about 16 in. long and 9 in. wide, and is raised at one end about 4 in. (Fig. 6.)

To commence the Three-rod Plain Border, first bruise each stake with the round-nosed pliers resting on the waling, then bend down the first stake behind the second, bend the second behind the third, and the third behind the fourth, all three canes to be projecting outward to the right (see Fig. 19, Stage i). Now take the projecting cane which is on the left of the other two and, passing in front of one upstanding stake, bring the cane behind the next upstanding stake and leave it projecting outward (Fig. 19, ii). Now bend down the first upright stake alongside, to make a pair of projecting canes as shown in Fig. 19, Stage iii.

Repeat these movements with the cane now projecting on the left hand of the next upstanding stake. You will now have 1 single cane and 2 double canes projecting outward. Repeat the movement with the single cane and bend the stake down behind it to make three pairs of canes projecting. From now onward you must always ignore the shorter canes and only work with the longer ones. The correct cane to use will always be the fifth cane counting from the right. Each stake when turned down should lie flat behind the shorter cane.

When the final stake is drawn through the loop formed by the first stake, only three long canes remain to be worked to complete the border. Refer to Fig. 19 for guidance in finishing. It will be noticed that in the "Finishing" diagram the first loop is marked 1, the second 2, and the third 3, and the three finishing canes X, Y, and Z. Tuck the cane X through loop 1, and bring it behind the stake and out under the border. Repeat the movement with Y and Z. Although this completes the border, the appearance is improved and greater strength is given to the top of basket if each projecting end is

tucked under the next two canes, through the basket and under the border (Fig. 19, "Extension of Border"). The ends should now be cut off neatly on the inside.

Shopping Basket

Materials Required—

- 8 pieces of No. 12 cane, 7 in. long.
- 32 No. 10 canes, 19 in. long.
- 32 No. 10 dyed brown canes, 7 in. long.
- ½ lb. No. 3 cane.
- 3 lengths No. 3 dyed green cane.
- 1 handle cane, 30 in. long.
- 3 lengths No. 5 cane.

The making of this basket presents an opportunity of introducing dyed cane in the waling

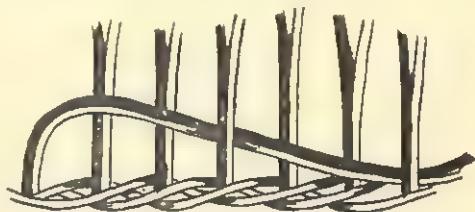


FIG. 20

Start of Double Trac Border

and border to form a pattern which is attractive and at the same time is constructional.

Make the base in the same way as in the waste-paper basket, and, when the work measures 5½ in. across, insert 32 stakes. Enclose these in a cane hoop of 10 in. diameter and then shape them to form the bowed sides of basket.

Weave three rows of upsetting, then rand for 6 in., carefully watching the shape all the time and remedying any defect when necessary. For the waling use two natural No. 3 canes and one green cane. Weave three rows, then cut off all three canes on the inside of basket. It will be noticed that the green cane advances one space to the right in each row. Re-insert the canes in the same spaces where they finished. The green cane should be on the top of the green cane of the last row and the natural canes on top of the other natural canes. Weave three rows of waling in the opposite direction, i.e. from right to left, to form the arrow-head design. Finish off with one row of waling with natural cane.

Re-damp the stakes. Now insert a short brown cane down the left side of each stake. To start the double Trac Border, bend down the first pair at a point about $1\frac{1}{2}$ in. above the top line of waling. Take the pair in front of two double stakes, then behind one and finally in front of two and leave the ends inside, resting on the waling (see Fig. 20). Repeat the movement with the next pair and then each pair in turn. At the same time, press the canes close to the previous row to prevent gaps from forming.

Carefully thread the final canes in their respective places to complete the pattern of the border. Bend the stout handle cane in the shape of a horse-shoe, sharpen both ends and insert them down by the side of a stake on opposite sides of basket. See that the handle is central, then insert the end of a No. 5 cane by the side of the handle on the left side of basket. Twine

this cane six times round the handle and allow for a space of $2\frac{1}{2}$ in. to 3 in. between each wrap. Now pass the cane through the outside of basket 1 in. below the top of border, then use the first row of wraps as a guide and let each succeeding wrap lie on the right-hand side of the first wraps. All canes must be parallel and no two canes must cross each other at any point. Continue the covering of the handle; when the binding cane is too short to reach the other side, weave the end away in the border and insert the end of a new cane down by the side of the handle as at the start.

After three binding canes have passed through the border on the left side of handle, take the rest of the canes through on the right side of handle to balance, and finally weave the end away in the border to make secure. Cut off all ends neatly.

WEAVING

THE discovery of weaving as a possible occupation for himself will awaken in a child a sense of power and well-being, for it will enable him to make many things he desires to possess. It is a practical craft for a Senior School, and may be carried on in the home later, as a hobby, by both girls and boys. It is particularly suitable, as almost all the necessary apparatus can be made by children.

If the whole craft of weaving is studied, that is, all the processes involved in the production of cloth from the raw material, new and valuable experiences will be gained, and curiosity will be stimulated, especially in regard to other nations and other times.

At a very early date clothing was found to be a necessity. The production of cloth is one of our staple industries; weaving therefore has been, and still is, a very important factor in our history. All nations have had their own methods of weaving, their own looms, materials, and designs.

Earliest Class Experiences

The co-operation of the class is essential to effective work; there should be no difficulty in this respect, for children are always interested in things which nearly concern themselves, as do their clothes.

A piece of cloth should be unravelled to discover how it is made, and an attempt to produce something similar should be undertaken. Rushes, grasses, strips of cloth, and other odds and ends may be used for this purpose. It will be impossible to proceed far, for the threads will slip about; then the question will arise: How to fix them? Discussion will lead to various suggestions as to possible methods, some of which should be tested to discover if they are practical.

Through experiment children will realize the necessity for a loom, even for the making of a simple piece of cloth. Further experiments will probably result in a variety of crude, but effective, looms, made of pieces of cardboard, of

wooden frames, and boxes. The first piece of material will probably be the result of weaving for the joy of watching its growth and testing colours: a use should be found for this. The second piece will be woven for some definite purpose: a paper pattern should be cut and the arrangement of colours planned; then the loom



FIG. I
Frame Loom

adapted to allow a piece of material the required size to be woven. It will be found that all the most familiar types of weaving can be carried out on these improvised looms.

Work of this kind is vital to a real understanding of the craft, for by means of such experiments the fundamental principles underlying the modern loom will be discovered, a knowledge of which is essential to an intelligent interest in any type of cloth-producing loom used to-day.

Throughout, as far as possible, apparatus should be built by the weaver, for a wide range of activities will be provided, involving thought

and initiative, if the builder is allowed to solve his problems with a minimum of suggestion from the teacher. Any work that has been done in the Junior School need not be repeated.

Figs. 1 and 2 show very simply-constructed looms. In Fig. 1, a frame loom, the length of the

hood of Halifax, Yorkshire, that visits should be paid to Bankfield Museum, where there is an almost unique collection of looms.

Fig. 3 is a copy of a West African loom which can be seen at that museum. It is set up with a string warp: the weft is of jute. Almost any



FIG. 2
Box Loom

material is short, being limited by the length of the frame.

Fig. 2 is a box loom, with the warp threads wound round it; the material is longer than that of Fig. 1. The upright cardboard, which is exactly the width of the box, and is placed nearer the back than the front, is raised after the warp threads are wound on—its purpose being to tighten the threads, which are probably rather slack; it can be lowered when the material is to be moved round for convenience.

Materials for Loom Building

Primitive man uses for his looms any suitable material he finds at hand; children may do the same. Collections of odd pieces of wood, light branches of trees, nails, cotton reels, and many other things should be made. Ideas for the use of such odds and ends may be gathered from the study of reliable pictures and models of looms, especially primitive ones; these may frequently be found in libraries and museums. It is suggested to all weavers who live in the neighbour-

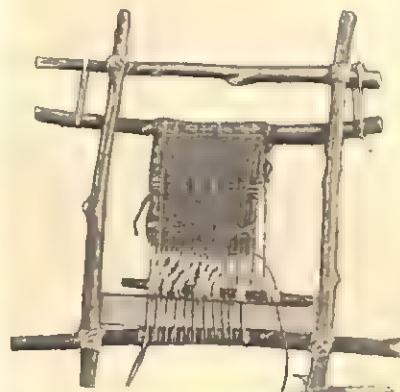


FIG. 3
West African Loom

material may be used on such a loom; even fine cotton weaving has been done quite successfully. The bar just below the top one may be raised or lowered by means of the string loops, according to the warp tension required.

Fig. 4 is an adaption of a primitive loom; an illustration of an original was found in *Studies of Primitive Looms*, by H. Ling Roth; this book is out of print, but is in some libraries; *Indian Blankets and Their Makers*, by George Wharton James, is another helpful book; both are full of interesting information.

Technical Terms

Weavers' terms should be introduced as each new step is taken—

1. **Loom**—the frame on which threads are fixed.
2. **Warp**—threads fixed on the loom.
3. **Weft**—threads which pass from side to side, between the warp threads.
4. **Heddle**—a device which lifts the warp threads to allow the weft threads to pass through.

5. **Shed**—the space made when alternate threads are lifted mechanically.

6. **Shuttle**—holds a long weft thread and carries it through the shed.

7. **Beater or spatula**—a thin piece of wood used to beat the weft threads close together, often shaped like a bread knife.

8. **Reed**—a number of vertical bars held in position by heavy horizontal bars at the top and bottom; the even spaces between the bars are known as "Dents."

The reed beats the weft threads together and keeps the warp threads evenly spaced. The number of dents to the inch is determined by the thickness of the warp threads, and consequently by the number of warp threads required to each inch of cloth.

9. **Pick**—each weft thread as it is beaten into position. "Beating-up" is one of the most important processes in weaving, and one of the most difficult in which to become skilled.

Heddles and Reeds

The most simple form of heddle is a piece of thin wood, varying from $\frac{1}{2}$ in. to 2 in. in width; this is slipped under alternate warp threads; when turned on its thin edge it will make a shed. This will speed up the work, but it will be necessary to darn the thread on the return journey.

However, a second shed may be made, in one of two ways—

1. On a narrow warp, tie a loop of strong thread, or fine string, to each warp thread not lifted by the wood, gather the loops into a bunch and tie firmly together; each loop should be about $1\frac{1}{2}$ in. long.

2. When material wider than a braid is required, take a long length of fine string and tie loops in it of equal lengths, at even distances apart. Make a shed with a narrow, but strong, piece of wood, attach the first loop to it and draw forward through the shed; place the second loop on the wood, allowing the first thread of the warp to lie on the string between the two loops; so continue until all threads are placed, and all loops are on the bar.

In the case of 1 or 2, a piece of wood will make one shed and the loops the second; the wood must be placed behind the loops. To work, push the wood as far back as possible and lift the loops, pass the shuttle through the shed thus made. Push the wood close to the string heddle and lift it on its side. Another piece of thin wood should be used to beat the picks into position; it may be straight or shaped like a

bread-knife. These are two methods commonly used by primitive peoples: for example, West Africans and North American Indians.

One Heddle to Make Two Sheds

North American Indians sometimes use a

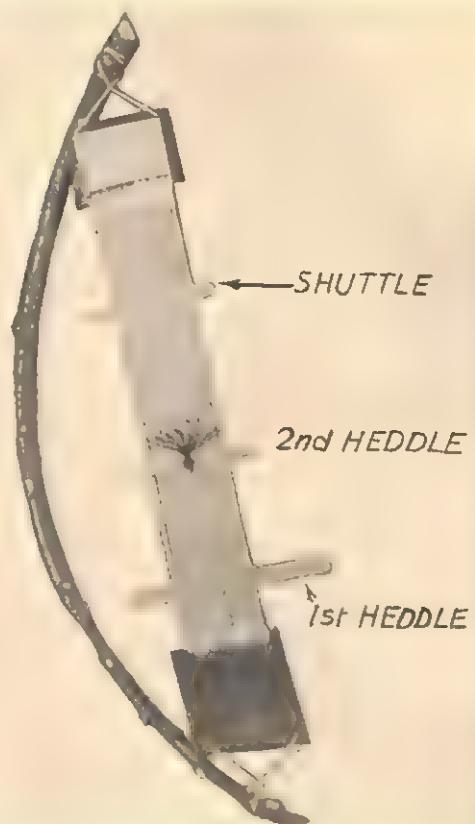


FIG. 4
Branch Loom

heddle formed of wooden bars, lashed side by side, with strong cord, to two pieces of wood (see Fig. 5, No. 2). There is a narrow space between each pair of bars, and a hole pierced through each one. A warp thread is passed through each hole and each space, so that, when the heddle is lifted, threads through the holes are raised, and when it is depressed the same threads are pushed down.

Norwegian and Lapp weavers often use a heddle of the same pattern, except that the bars

are set into a grooved piece of wood at the top and bottom (Fig. 5, No. 1). These heddles can be easily made, but, if wood is too difficult to

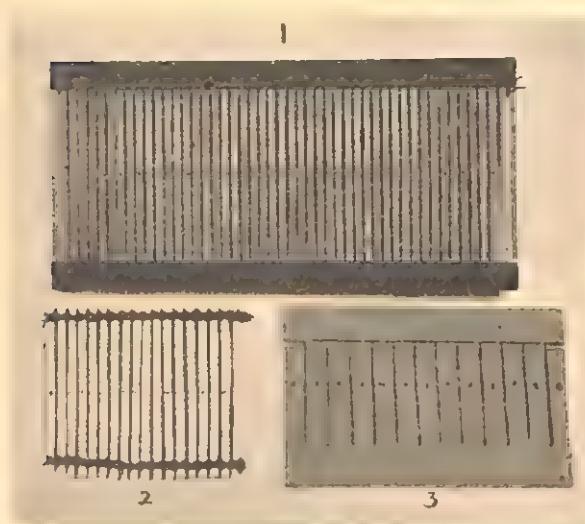


FIG. 5
Heddles

manipulate, stout cardboard, or two strips of thin card glued together, will do. Fig. 5, No. 3, shows such a heddle made by a child.

Shuttles

The type of shuttle made will depend upon the length of the weft thread required, and the depth of the shed it is possible to open. To carry a short length of thread, a piece of wood with a hole bored through one end, and threaded like a bodkin, will be best. For longer lengths use a piece of wood or bone, round which the thread will be wound, or a piece of wood notched at the two ends, with the thread wrapped lengthwise.

Colour and Design

Weaving is invaluable, perhaps essential, to the Art work of any school, for by practical means theories on design and colour may be demonstrated. Children should design each article, before setting up their looms, by cutting a paper pattern, either the required size, or to scale, and considering the proportion of the

whole. The position and amount of decorative pattern necessary may then be decided upon. This preparation will help the pupils to realize that by "Design" is meant the construction of the whole and not merely "Decoration." Colour combinations may be tested and easily modified if necessary.

No other method of working offers the same facilities for quick alteration. The same effects cannot be obtained with either paper or paint, for in weaving the colour of the weft is influenced by the colour of the warp. Interesting discoveries may be made; for example, an orange thread run through blue warp may appear to become pink.

Decorative Patterns

It is always wise for inexperienced weavers to build up patterns as the material grows, for there will be practical difficulties to overcome which will be discovered by experience only.

I. Simple patterns can be obtained by the arrangement of coloured weft threads using



FIG. 6
Patterns

"Tabby Weave" only, that is, 1 thread up and 1 thread down, as in darning—

- (a) Bands of colour in varying widths.
- (b) 1 pick red, 1 pick orange, 2 picks red (1 pick orange, 1 pick red), repeat the two in brackets several times, then 2 picks red, 1 pick orange, 1 pick red. (Fig. 6, No. 1, and Fig. 26.)

2. Stripes and plaids—

(a) Warp threads of different colours; two colours arranged alternately: for example, 1 thread green, 1 thread blue, or several colours arranged in varying

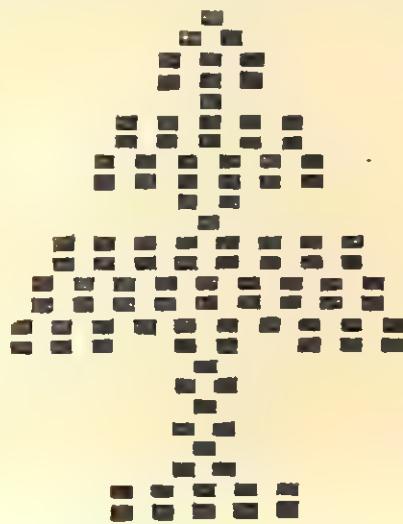


FIG. 7

Diagram of Pattern

The white spaces between the pattern lines represent the binding picks

widths; with weft of one colour only, will give length-way stripes.

(b) Warp threads arranged in bands of colours, with weft woven in a similar manner, give plaids.

Odd pieces of material will often offer suggestions.

3. Darned patterns—

When the required amount of tabby has been woven, begin a new line, tabby for 5 threads for selavage, over 3, under 1, over 3, under 3, over 1, under 1, over 1, under 1, over 1, under 3, repeat to the end of the line. If the pattern does not balance, and if 5 threads are not left for the selavage, some slight modification must be made. Examine top pattern in Fig. 6, No. 2.

Between each row of pattern weave a pick of tabby, using the background colour; these picks are introduced to bind down the warp threads.

4. Finger weaving—

Patterns suitable for cross-stitch may be used. Put the pattern thread in with the fingers (Fig. 7).

Trees arranged at even distances apart will make an attractive border. Each tree trunk must be built up with a separate thread; long threads at the back must be avoided; the ends will hang down behind. Between each 2 rows of pattern, insert a binding pick. When the work is finished press under a wet cloth and cut off any ends.

A Norwegian Braid Loom

Cut warp threads of equal lengths, about 1 yd. long, and of different colours. Fasten each thread to a bar of wood, and pass it through a

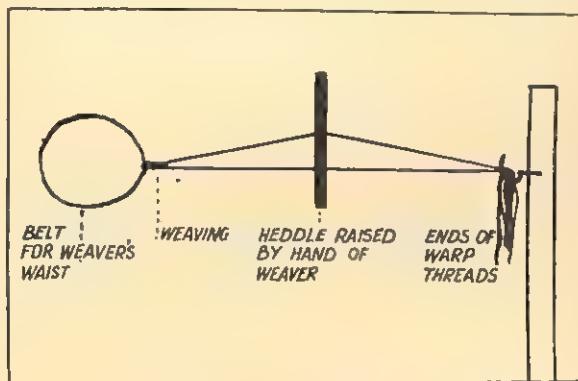


FIG. 8
Norwegian Loom

hole, or a space, in the heddle, Fig. 5, No. 1 or 2. When all are threaded, gather together the loose ends and tie them into a loop knot at a distance of 12 in. from the wood. Fasten the loop to a hook or firm piece of furniture; the back of a chair will do, if it is possible to sit with feet firmly placed on the lower bar. Attach a cord to the bar of wood and fasten it round the waist: the tension is kept by the pull of the body (Fig. 8). Make a shed, put a flat stick into it, lift the stick on one side, insert the shuttle and draw it through. Each weft thread should be pulled so tight that it does not show. The pattern is obtained by the arrangement of coloured warp threads. As the braid grows, wind it round the bar.

A Victorian Braid Loom

Fig. 9 shows a copy of a loom often used by early-Victorian ladies. The heddle is like the

Norwegian one shown in Fig. 5 (No. 1), but it is fixed; the sheds are made by lowering and raising the warp in such a way that the threads through



FIG. 9
Victorian Braid Loom

the spaces are alternately above and below those through the holes. There is no cloth beam: the end of the warp is held in one hand and the shuttle in the other. Originals, sometimes to be seen in museums, were made of hard wood.

Looms for Long Lengths of Wide Material

After making and working upon looms of simple construction, the pupils will have some realization of the thought that has gone to the building up of the craft of weaving. If they have overcome difficulties which have presented themselves as they have worked, they will be prepared to face new problems for the sake of achieving better results. The building of Figs. 10 and 11 is quite within the power of girls and boys under 15 years of age; these looms will carry material sufficient in width and length to make skirts, jumpers, children's dresses, and other useful articles.

Construction of Looms

The framework must be absolutely rigid: a strong wooden box will serve. Cloth beam—a roller at the front of the loom (on the left of both Figs. 10 and 11): the woven material is rolled

on to this. A similar roller is at the back; it is known as the "Warp Beam," for the warp threads are wound upon it. Long nails driven through the supports and well into the beams hold them in position; on these nails they turn freely.

Some device must be found to keep the beams firm when weaving is in progress. Note two methods shown in the illustrations. Fig. 10 has a disc of three-ply wood, with six holes punched near the outside edge, nailed firmly to the beam; a strong nail placed through one of the holes pulls against the support and keeps the beam steady. Another method is to pierce a hole in the support, in such a position that a nail passed through it will enter the holes in the disc as they are turned round. Cocoa-tin lids have been used quite satisfactorily in place of three-ply wood.

The *reed* is immediately behind the cloth beam. Both looms are fitted with reeds 22 in. wide. In Fig. 10 the reed is fitted into grooved pieces of wood; these are attached to the bottom bar of the loom by means of screws and can be

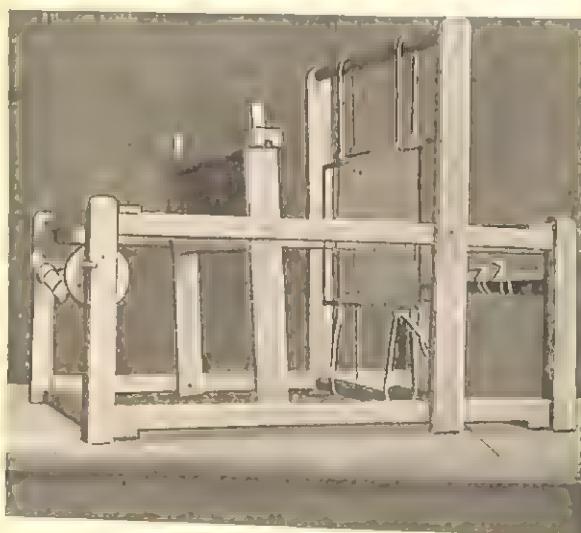


FIG. 10
Table Loom

swung backward and forward at the will of the weaver. In Fig. 11 the reed slides backward and forward on two brass bars attached to the loom at the back, and supported by the upright bars

of the framework. A reed suitable for work at this stage cannot be made by amateurs; for, besides keeping the warp threads evenly spaced, it is used for beating: consequently, it must not bend at all. It should be made of either steel or brass wire; brass is a little more expensive, but it does not rust.

A satisfactory weave for scarves and jumpers may be obtained by using three-ply wool, 12 threads to the inch, with a reed of 12 dents to the inch, 1 warp thread through each dent. For a finer weave of wool or cotton, 24 threads to an inch will probably be required, when 2 threads may pass through each dent, or the reed may be changed for one of 24 dents to the inch.

Heddles. Fig. 10 has two heddle frames with wire heddles, each one pierced in the middle. The wire will vary in thickness, as will the hole, or eye, in size, according to the thickness of the warp threads usually used. The same wires will do for 24 threads to the inch as for 12. The wires also have eyes at the ends through which strong steel bars are passed; these are joined at the two ends by two other bars, the four forming

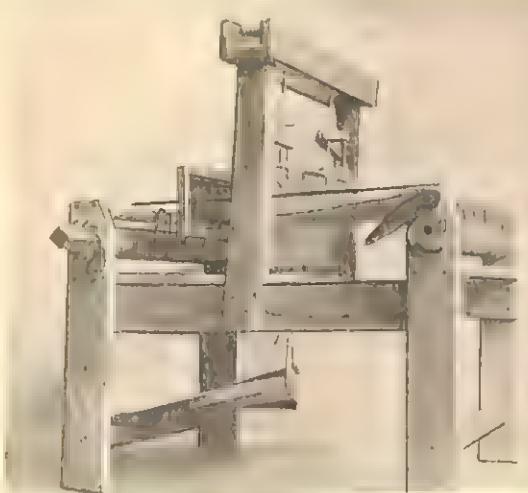


FIG. 11
Treadle Loom

a frame. At one end of the frame the bars are fastened together by means of screws and nuts, so that more wires may be added if necessary. The heddle frames hang on two strong cords

passed over the roller; at the top of the roller, knots are tied in the cords, and nails are driven through them into the roller. As the roller is

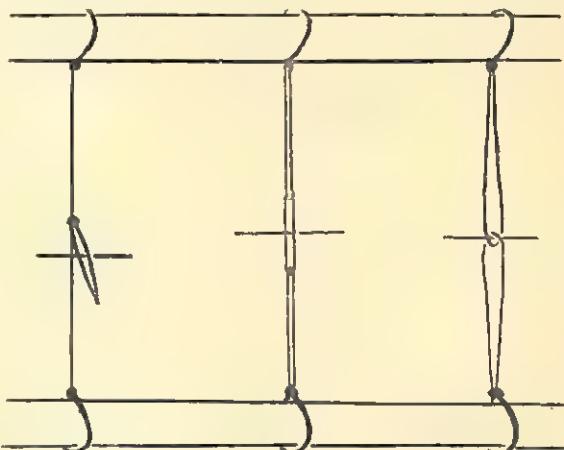


FIG. 12
Three Primitive Methods of Making Heddles

turned, the frames are alternately lifted or pressed down.

Heddles are often made of string, with steel eyes; they are supported by wooden shafts. These are cheaper than wire ones, but not so lasting, and they are more difficult to thread. Fig. 12 shows three primitive methods of heddle making which may be used by children. They are made entirely of string and are suspended on a wooden bar; another at the bottom weighs them down. The lines drawn through the eyes represent warp threads.

Treadle Loom

Fig. 11 is worked by means of treadles, two or four as required. The heddle frames hang on two nails, or strong wooden pegs, which are driven through from the front wide bar, at the top of the loom, to the back one; again they are attached to the treadles by means of cords. Hinges join the treadles to the front bottom bar of the loom, so that they can be pressed down by the feet of the weaver.

Warp Making

When long, wide warps are needed, the threads cannot be cut separately; they must be

arranged, in their full length, side by side, so that tangles are avoided. A frame of some kind is necessary.

Fig. 13 shows a very simple frame; with this

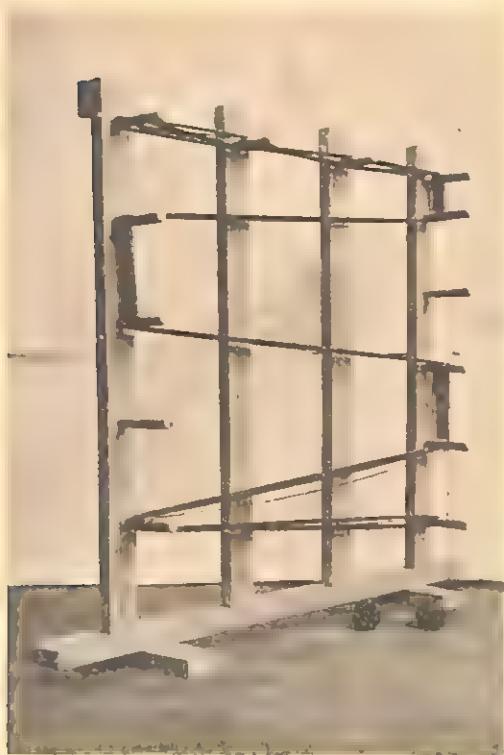


FIG. 13
Warping Frame

2 threads may be warped together if desired; note 2 balls of wool.

Fasten the 2 threads together before the top left-hand peg, pass 1 above and 1 below peg 2, then cross the bottom one over peg 3 and the top one below. Take them together round as many pegs as necessary to give the required length of warp, ending on the bottom right-hand peg. Wind the 2 threads upward until they reach peg 3, separate them and cross them between pegs 3 and 2 (alternate threads up or down), pass them together round peg 1. Repeat this process until the required number of threads is on the frame.

As each set of 10 threads is warped, tie them together, with a thread of another colour, at the bottom peg; do this to simplify counting.

If a frame cannot be secured place two chairs with the front edges of the seats together (Fig. 14). Tie a stick firmly to the back of No. 1 chair, in an upright position, about 2 in. from the right-hand side. Fasten the end of the thread to the top bar of chair No. 2, so that it starts from the bottom of the bar, draw it across to the back of No. 1, pass it through the 2-in. space, below the bar, then upward, crossing behind the stick and over the bar, across to the top of No. 2, place it at a short distance from the beginning of the thread. Wind it from one chair to another, if necessary passing down to the lower bars. When a sufficient length has been wound on, turn back and follow through until the stick is reached, pass this on the other side to the outward journey and carry the thread over the top of No. 2, pass below and follow the first thread outward again. The threads will cross one another between No. 2 and the stick.

The Length of Warp Required

For material 90 in. long, the length of the warp must be 90 in. long plus the length of the loom, from the warp beam to the cloth beam, probably about 36 in.; these extra inches will disappear as the material is woven. A beginner should be generous, so take a thread 130 in.

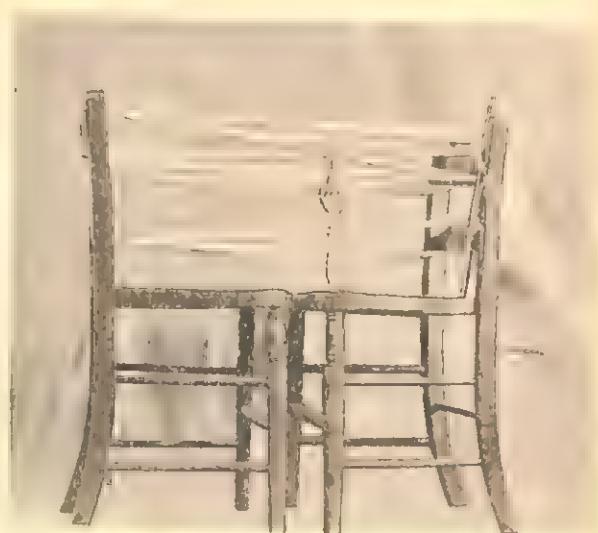


FIG. 14
Warping on Two Chairs

long, fasten it to the frame or chairs and wind it on as described; this will be a test thread and will show exactly how the warp threads should be placed.

The Number of Warp Threads Required

For material 21 in. wide, as the weaving will incline to narrow allow 22 in. Three-ply wool is to be used; a satisfactory weave will result if 12 threads to the inch are allowed, with a double thread at the selvedges. $22 \times 12 + 2 = 266$ threads will be placed, so that if 2 balls are used as in Fig. 13, 67 journeys outward and 66 back will be made. If only 1 thread at a time is placed, 133 journeys outward and 133 back will be necessary.

Securing the Warp

When the warp is made, tie the threads together at both ends, those above the pegs or bars, then those below. Find the cross and pass a long thread of another colour forward through the space on one side and bring it back on the other, tie the two extreme ends together. Cut the warp at the beginning and end, behind the chairs or pegs, remove carefully and lay on the table. Take the ends farthest away from the cross, and crochet a chain; draw the end through the last loop, so that the threads will not become entangled.

Threading the Heddles

Loosen the warp chain to free the cross and long loop, remove the ties from the ends. It will be found that the threads are arranged alternately above and below the coloured loop: this will show the order in which the threads must be put into the loom.

Stand behind the loom, place the warp chain over the back bar for support, hold the warp at the cross, in the left hand, take the 2 first threads and pass them through the first eye on the right hand of the back heddle, draw them forward and pass them through the first space of the front one. Take the next thread, pass it through the space next to the eye just threaded,

and through the second eye in front; proceed until all are threaded; put 2 through the last eye.

When material narrower than the width of the loom is to be woven, care must be taken not to have the weight of all the unused wires on one side, or the heddles will not work evenly. For material 12 in. wide, 144 threads will be needed, not counting the extra selvedge threads. That will be 72 through the back heddles and 72 through the front; find the middle eye on each frame, count 36 to the right and begin to thread there.

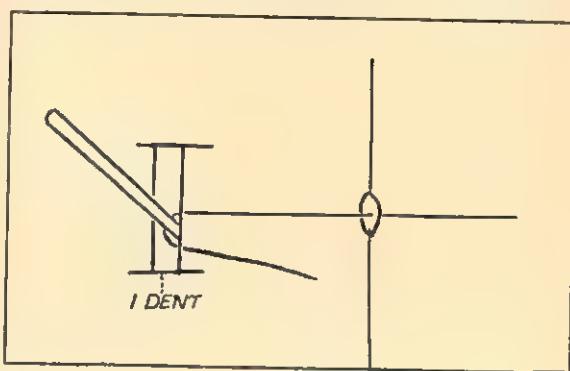


FIG. 15
Threading the Reed

Threading the Reed

Stand in front of the loom, take the end of the first thread on the right and draw it through the first dent. To do this use a piece of thin wood or bone, about 3 in. long, $\frac{1}{2}$ in. wide, and thinner than the width of the dent. With the right hand place the piece of wood in the dent, from the front, with the left hand double the thread, behind the reed and below the wood, with a movement which will lift the end of the wood in the hand and depress the forward end, catch the loop and draw the thread through (Fig. 15).

If a 22 in. reed is used and only 12 in. material is to be woven, mark off 11 in. on the top bar with chalk, measure 6 in. to the right of that mark, and begin to thread there.

To both the cloth beam and the warp beam nail a piece of strong cloth, the length of the roller and 4 in. wide. At the front edge make a hem $\frac{3}{4}$ in. wide; through this pass a strong

bar of wood. In the material make 4 slits, at equal distances apart, immediately behind the bar, insert through the slits pieces of strong cord 5 in. long; tie the ends to form loops; through the loops, twisted to form figure 8, pass another narrow, but strong, piece of wood. Take 12 threads from the right, pass them over the front bar attached to the cloth beam, downward through the space, and forward, bring 6 threads up on either side of the 12 and tie across; so tie in all the threads.

At this stage it will be necessary to secure help, one person to stand at the cloth beam, the other at the warp beam. Gather up the warp behind the heddles, brush firmly about 1 yd., with a soft scrubbing brush, to remove tangles and fluff, divide the threads into 2 bundles and hold securely in two hands; the second person now rolls the threads on to the cloth beam; they must be rolled on evenly and not allowed to become at all slack. When the hands reach the heddles gather up more warp, brush, and repeat the processes until there is sufficient behind to tie to the warp beam bar. Fasten the cloth beam so that it cannot move, tie threads to the warp beam bar, 12 on the right-hand side and 12 on the left, drawing them as tight as possible, until the middle is reached and all are fastened. Cut off all uneven ends. Draw the warp on to the warp beam, being still more careful to arrange the threads in order and to keep the tension even, fasten both rollers firmly. It is wise for beginners to perform this double winding process, as it is essential that all threads shall remain taut while weaving is in progress.

How to Weave

Wind the shuttle, draw the reed forward, lift the front heddle with the left hand, push the reed back, pass the shuttle through the shed with the right hand, draw the thread with the left hand, beat with the reed into position (one firm beat). Keep the reed forward, lift the second heddle with the right hand, push the reed back, put the shuttle through with the left hand, draw the thread with the right hand and hold the end with the left hand to set the width of the material, draw the reed forward with the

right hand and beat. Success will depend largely upon an even beat.

Pattern Weaving with Four Heddles

We are fortunate to have many lovely traditional patterns to help us in cloth making. Most of these had been entirely forgotten, just as had many folk songs and dances. Some years ago it was discovered that a number of people were living very simple lives in the Appalachian Mountains. They were dancing the dances of their forefathers and weaving the same patterns. Drafts of these patterns are to be found in *Foot Power Loom Weaving*, by Worst. Each pattern has its traditional name: for example, "Chariot Wheels," "Gentleman's Fancy," "Honeysuckle," and "Monk's Belt." The material is usually Linsey-Woolsey, a white linen warp with a wool weft; the wool is dyed with vegetable dyes. Cotton is now very often substituted for the linen thread. These materials when the weaving is only "tabby" give most satisfying results. When 4 heddles are in use 4 "Horses" are necessary—note the 4 short wooden bars above the heddle frames in Fig. 11. The top cords pass through the middle of the horses. Heddle No. 1 is attached by other cords to the outside ends of the 2 front horses, No. 2 is fastened to the inside ends of the same, Nos. 3 and 4 are attached to the two back horses in like manner.

Twill Weave: Four Heddles

The heddle near the reed is No. 1. Thread the first thread through an eye on No. 1, the second through an eye of No. 2, 1 through No. 3, and 1 through No. 4; repeat through Nos. 1, 2, 3, 4 until all threads are disposed of. The right-hand treadle is No. 1. Tie treadle No. 1 to heddle No. 1, No. 2 to No. 2, and so on. Press down treadle 1, then 2, 3, 4; continue in this way and the result will be a serge weave. Experiment for variety, for example press first treadle 1, then 2, 3, 4, 3, 2, 1, 2, 3, 4. No binding thread will be needed.

Rose Path: Four Heddles

A traditional pattern and one of the simplest to thread up.

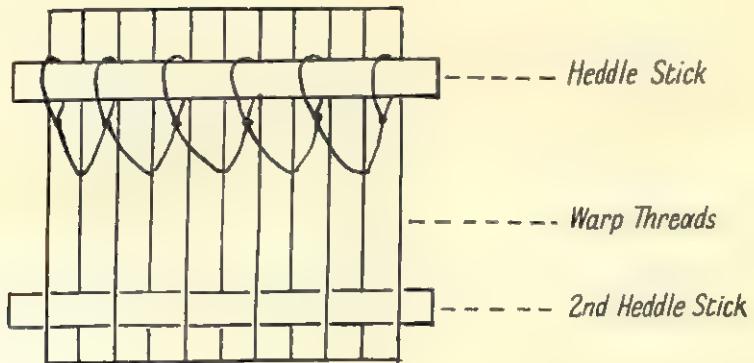
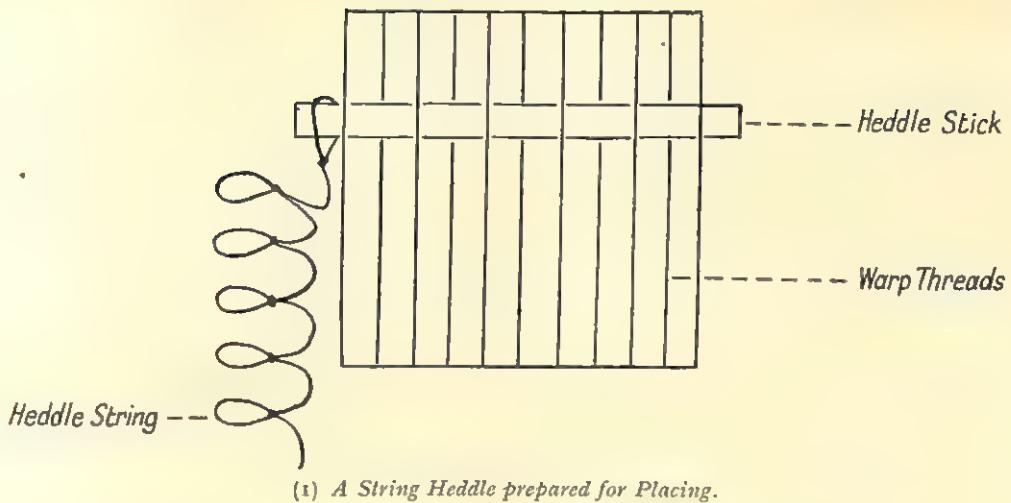


FIG. 16

(2) String Heddle in Position.
The String Heddle

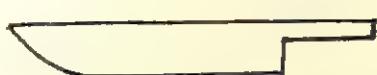


FIG. 17
A Beater or Spatula

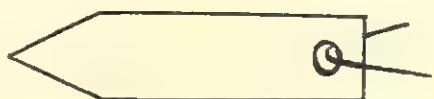


FIG. 18
A "Bodkin"—to carry Short Lengths of Thread



FIG. 19
A Useful Shuttle

Tie treadles to heddles as for a twill weave. Thread for selvedges Nos. 4, 2, 3, 1, 4, 2, 3, 1, for patterns Nos. 4, 3, 2, 1, 2, 3, 4, 1, repeat as many times as necessary, leaving 8 threads for selvedge. For tabby and binding threads press down treadles 1 and 3, 2 and 4.

For pattern the treadles may be used as follows: 1 and 2, 3 and 4, 2 and 3, 1 and 4. As a binding thread will be placed between each row of pattern, the same combination may be repeated: for example, 1 and 2, binding thread 1 and 3, 1 and 2, binding thread 2 and 4. Fig. 6, Nos. 2 and 3, are patterns evolved from Rose Path (see also Fig. 26).

Teachers who need advice in regard to heddles and reeds should write to some well-known handicraft firm; or to James Whitwham, Ltd., Reed and Heald Makers, York Street, Bingley, Yorks; this firm is making a specialty of loom apparatus for schools

N.B. Heald is the West Riding name for a heddle.

When ordering a reed and heddles, state what number of threads to the inch will be used, also the width of the reed required, so that a suitable reed and heddle wires may be supplied.

Special wires may be bought for 24 threads to the inch, but it is possible to use the 12 ones, so saving fuss and expense—it would not be advisable to use the same for 36 threads.

Raw Materials

No man is a true craftsman who is not intimate with the preparation of his materials. It is impossible for school children to prepare all the materials they will use, but every weaver should work through all the processes at some time. This may be done whenever the teacher feels she can most effectively arouse interest: it may be that it will be the outcome of a history or geography lesson, e.g. what becomes of the wool produced on Australian and Canadian farms?

Wool will certainly be prepared first, because in its raw state, on the sheep's back, it is familiar, also on account of the simplicity of its preparation. Very frequently wool is spun straight from the fleece; this saves time, but wool must not be handled when its absolute cleanliness is uncertain. To wash and card will add to our

experiences and to a better knowledge of the craft as carried out by our ancestors.

In the Middle Ages, and up to the eighteenth century, even in many places much later than that, weaving and the preparation of wool were carried out in the homes of the people. A real understanding of these processes, gained from actual experience, must help one to realize how the coming of machinery changed conditions of life in this country, and what the term "Industrial Revolution" means.

Scouring

Dissolve soft soap in hot water, add cold until the water is just warm, dip the wool in and out, being very careful not to mat it. Change the water as often as is necessary to remove all dirt. Rinse well in clean water and hang out to dry. If the wool is very yellow, a little washing blue may be added to the rinsing water.

When washing cloth it is usual to rub and wring it, but wool fibres so treated would cling together and become felted.

Dyeing with Vegetable Dyes

Wool may be dyed at this stage, or later when it has been spun. Dyeing is an experience which no weaver should miss. It will enable him to make simple scientific discoveries, such as that colour is frequently influenced by minerals and that mordants are often needed to bind wool and dye together. It will provide him with a range of permanent colours, very soft and beautiful. If spun wool is used any soft white wool will do, but unbleached will give better results.

The work must of necessity be experimental; it will be well to begin with dyes which are most easily obtained. Boil the dyestuff in water, put in the wool, see that it is well covered, keep gently boiling until the colour comes. It is sometimes better to keep the dye just below boiling point. Useful mordants for school use are: powdered alum, vinegar, common salt, cream of tartar, and green copperas.

Different mordants and different methods are necessary for cotton.

Experiments

1. Brown skins of onions give colours ranging from pale buff to dark brown.
2. Onion skins with alum give bright yellows. Other yellows may be obtained from orange and lemon skins, tomatoes, flowers of broom and gorse. The following all need alum: privet leaves (autumn), dandelion flowers, nettles, amphilopsis leaves (when falling).
3. Greens from pine needles (autumn). With alum, elderberries, oak leaves (autumn), purple iris flowers (when fading), laurel and ivy leaves (March).
4. Dissolve indigo paste (1 tablespoon to 1 lb. wool) in hot water, enter wool already dyed yellow and boil.
5. Browns from husks of walnuts (when ripe), tea leaves and coffee grounds (collected from pots after use), lichens (second year), red currants.
6. Black and grey from dock roots (March), with a small quantity of green copperas, blackberries, privet berries, elderberries.
7. Red from red poppies (when the flowers are falling) with salt.
8. Blue and purple from bilberries and elderberries.
9. Try elderberries in a zinc-lined pan and in a brass one.
10. Try beetroot in different pans, not forgetting one of aluminium.

10. Dye with log-wood chips, using a zinc-lined pan, and an enamel-lined one, then drop a little alum into both pans. When carrying out this experiment it will be interesting to see the colour change when it is exposed to the air.

A well-kept brass or copper pan will often strengthen the colour, and will on the whole give the best results.

Only small quantities of the mordants will be required, often $\frac{1}{2}$ oz. to 1 lb. of wool. After dyeing rinse the material well and hang it in the air for at least 12 hours, no matter what the weather. Fresh air will set the colour.

Less familiar dyes than those already suggested, indigo paste, logwood chips, fustic chips, madder and cochineal may be obtained in small quantities from Skilbeck Brothers, 205 Upper Thames Street, London, E.C.4.

Teasing, Oiling, Carding

TEASING

When the wool is dry, pull the fibres apart with the fingers; remove any foreign matter still attached to them, also any tangles.



FIG. 20
Carding

OILING

Sprinkle a very little olive oil on to the wool, and gently work it in.

CARDING

To spin a continuous length of thread, it will be necessary for the fibres to lie in the same direction.

To make them do this obtain a pair of carders. A hand-carder is a hard piece of wood with a handle, on the surface of which is secured, by means of nails round the edge, a strong piece

of leather. Through the leather, and arranged in regular rows, are a number of fine wires, bent slightly at the middle towards the handle of the carder (Fig. 20). To card wool sit on a low seat, press wool fibres between the wires of one carder,



FIG. 21
Hand Spindles

hold the handle, turned away from the body, in the left hand, set the carder firmly on the knee. Take the second carder in the right hand, wires downward, press it, not too firmly, on the wires of the first and draw it forward so that the wool is caught by the wires, and is also drawn forward (Fig. 20). Repeat this operation until all the fibres appear to be arranged in the same direction, that is, from handle to handle of the carders. To release the wool turn the handle, held by the left hand, round towards the body, so that all wires are bending in the same direction. Draw the top carder over the bottom one with a slight upward movement, shake the wool from the top carder on to the back of the lower one, roll the wool very lightly between the two wooden surfaces and you have a "top."

Spinning

Hand spinning is by no means dead; it is still the everyday work of many women; for instance, Breton, Italian, and women of the Scottish Highlands. When a wheel is not available a spindle with a whorl is used. A spindle is a round stick with a hook at the top; a whorl, of wood or clay, is on the stick near the lower end, at about one-third of the length (Fig. 21, middle spindle).

Tie a spun thread round the middle of the spindle, carry it downward and fasten it round the spindle below the whorl, bring it upward and fasten it round the hook. The best way to place the thread, so that it will keep in position, is to hold the spindle in the left hand, pass the thread over the first finger and thumb of the right hand to form a loop, and push the spindle upward through the loop (Fig. 22).

Separate the fibres at the end of the thread, that they may mix freely with those of the

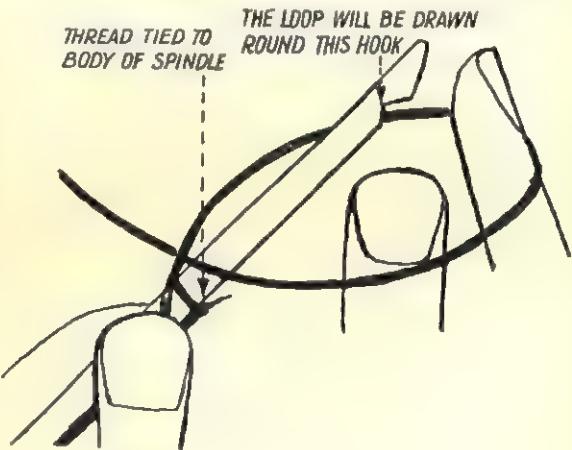


FIG. 22
Fastening Loop on Spindle

top. Gently pull out fibres from the top, do not pull them away, hold them in the left hand and allow the top to rest on the left arm. Hold the head of the spindle in the right hand, and end of the thread, together with the fibres from the top, between the thumb and finger of the left hand. Revolve the spindle with the right hand until the fibres are twisted together (Fig. 23).

The spindle is often dropped from the right hand and suspended on the thread; it is kept

whirling so. The right hand is held at some distance from the left; it grips the thread, or yarn, lightly. This method allows the yarn to grow, in length, until the spindle touches the floor. When too long for convenience, the yarn



FIG. 23
Spinning

should be unhooked from the top and bottom of the spindle, wound round the body of it, and rehooked; the spinning is then continued. When the spindle is full of yarn (Fig. 25), wind it into a ball, or on to a paper spill.

Variety may be obtained by carding fibres of different colours together.

Wool need not necessarily be dyed before it is carded and spun; it is frequently more convenient to do it afterwards. In this case the order of procedure would be: 1, Scouring; 2, Teasing; 3, Oiling; 4, Carding; 5, Spinning; 6, Winding into skeins; 7, Dyeing.

In Fig. 21, spindle on the left is a forked stick and is used by a tribe in the Soudan (*Methods of Hand Spinning in Egypt and the Soudan*, by Grace M. Crowfoot, Banfield Museum publication). The middle spindle has a whorl of clay and is a copy of one used by ancient Egyptians. The third shows a spindle made by a child.

The third shows a spindle made by a child.

How to Use Hand-Spun Yarn

Spinners will be anxious to make use of their thread quickly; so that it may be advisable to

spin, at first, just sufficient to make some small article, such as a needle-case cover.

The cloth may be woven on any simple loom, using hand-spun yarn for both warp and weft. The cloth produced will be of a pleasantly uneven texture, the result of unevenly spun yarn. Natural brown wool spun and used with natural cream is a very effective combination.

It will be unwise to use hand-spun yarn for a warp in any loom which has a sliding reed, as shown in Figs. 8, 10, and 11; for on account of its unevenness it will be quickly cut. A machine-spun warp, with hand-spun weft, will give interesting cloth. Hand-spun wool may be introduced as pattern threads only, with machine-spun binders.

Any of the simple patterns suggested earlier will be quite suitable for these materials; but

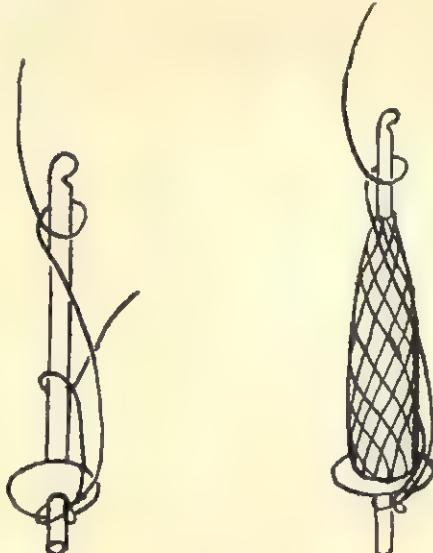


FIG. 24
Hand Spindle before Spinning is begun

FIG. 25
Hand Spindle full of Yarn

if a change is desired the following patterns may be useful. Wool or cotton warps can be used, preferably white or natural, with weft threads of dyed or natural brown hand-spun wool.

TWO HEDDLES

THREAD: 1st warp thread through 1 eye on back heddle.

2nd warp thread through next eye on back heddle.

3rd warp thread through 1 eye on front heddle.

4th warp thread through next eye on front heddle.

REPEAT: 2 threads through back heddle, and 2 threads through front heddle, until all are threaded.

Two threads should be passed through each dent in the reed, so a fine reed should not be used.

To WEAVE, lift the heddles alternately.

FOUR HEDDLES

THREAD: 1st thread through 1st heddle.

2nd thread through 2nd heddle.

3rd thread through 3rd heddle.

4th thread through 4th heddle.

Tie heddles to threadles: 1st to 1st, 2nd to 2nd, and so on.

PRESS DOWN treadles 1 and 4 together; 1 and 2 together; 2 and 3 together; 3 and 4 together.

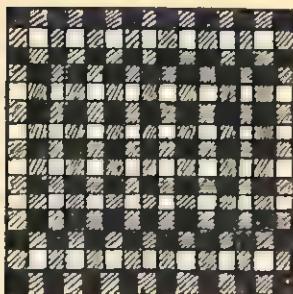
REPEAT this order of treadling until the length required is woven.

Cutting Articles from Hand-Woven Cloth

Whether cloth is woven of machine-spun or hand-spun yarn, cutting out will be done in the same way.

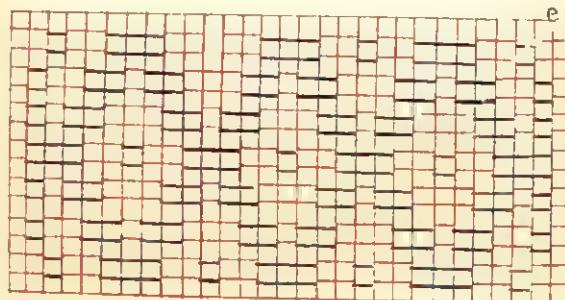
Lay a paper pattern on the cloth, draw round it with chalk, and back-stitch firmly or machine on the lines; cut outside the lines to allow for turnings.

Stitching is suggested, as loosely woven cloth unravels very quickly, and consequently it is difficult to make up.

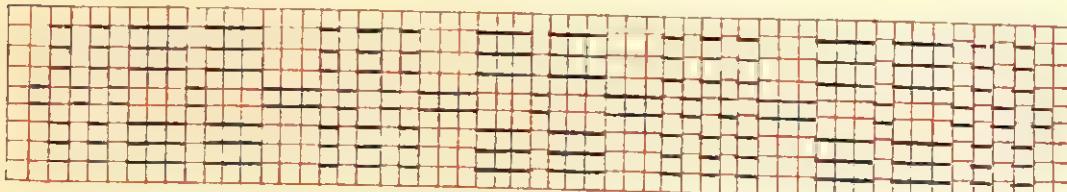


Draft of Pattern shown in Fig. 6, top left-hand example.

- Brown Warp Threads
- Red Weft Threads
- Orange Weft Threads.

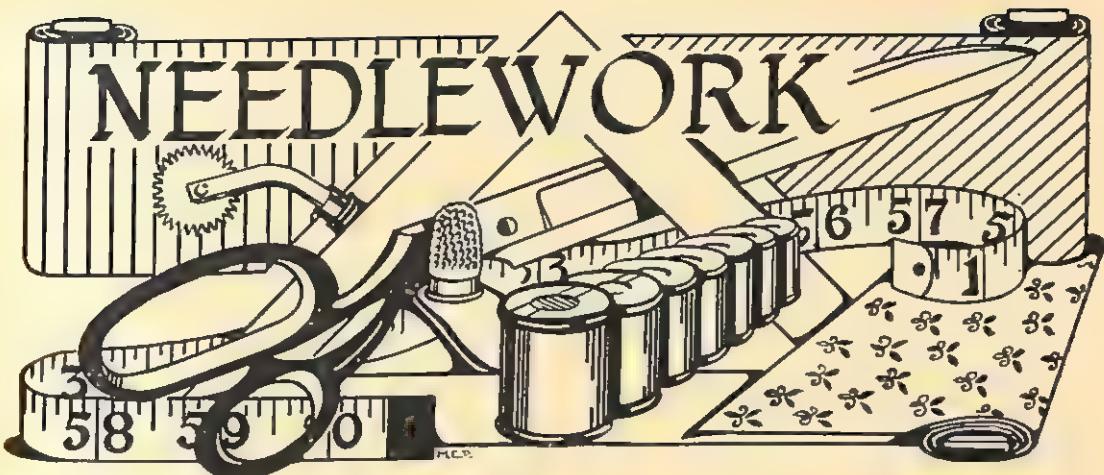


Draft of Pattern shown in Fig. 6, example at bottom of photograph. A binder thread must be inserted after each row of pattern.



Draft of Pattern shown in Fig. 6, top right-hand example. A binder thread must be inserted after each row of pattern.

FIG. 26
The Drafting of Patterns



PATTERN MAKING

WHEN dealing with abnormal figures, take direct measurements, but this table will be of general use for Seniors—

Age of Girl	Average Height of Girl	Average Bust Measure	Average Length Neck to Waist
Yr.	Ft. In.	In.	In.
11	4 4	31	13
12	4 6	32	13½
13	4 8	33	14
14	4 10	34	14½

Proportions of the Body

Neck to waist = $\frac{1}{4}$ of the height.

Waist to knee = $\frac{3}{8}$ of the height.

Knee to foot = $\frac{1}{4}$ of the height.

Neck to waist plus waist to knee = $\frac{5}{8}$ of the height = approximate length of a frock.

Neck to foot = $\frac{7}{8}$ of the height = approximate length of a nightgown.

The sleeve length is taken from the end of the shoulder over the elbow and down to the wrist. This works out to equal about $\frac{3}{8}$ of the height.

Bodice Block Pattern

This pattern is suitable to use as a foundation on which to build patterns for children's garments.

Specimen pattern for girl of 11 years—

Cut an oblong of paper $\frac{1}{2}$ of the bust measure plus 1 in. \times the back length plus $\frac{1}{2}$ in.

Bust measure 31 in.

Back length 13 in.; i.e. oblong to measure 13½ in. \times 16½ in.

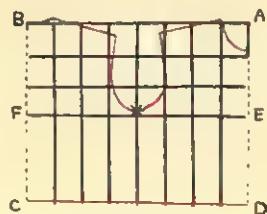
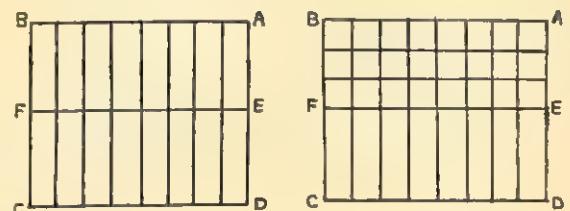
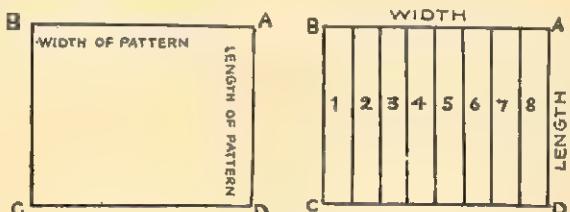


FIG. I
Bodice Block Pattern

Mark the corners of the oblong *ABCD* as in diagram.

A to *B* equals $\frac{1}{2}$ the bust measure plus 1 in. and equals the width of pattern.

B to *C* equals the back length plus $\frac{1}{2}$ in. and equals the length of pattern.

Fold the paper widthways into 8 equal divisions (see diagram).

Fold the oblong *ABCD* into 2 equal divisions lengthways.

Fold the oblong *ABFE* into 3 equal divisions lengthways.

Back neck curve = 1 division on and $\frac{1}{2}$ in. down.

Front neck curve = 1 division on and 1 division down.

Back shoulder = 3 divisions on and $1\frac{1}{2}$ in. down and $\frac{1}{4}$ in. out.

Front shoulder = 3 divisions on and $\frac{3}{4}$ in. down and $\frac{1}{2}$ in. out.

The star denotes the centre of the paper. Curve in the armhole from the end of the front shoulder to the star, and to the end of the back shoulder.

Extension of the Bodice Block Pattern

This pattern is obtained from the block pattern and from it may be built patterns of the following—

1. Dresses.
2. Princess petticoats.
3. Nightdresses.
4. Overalls.
5. Dressing gowns.

Place the block patterns on to a large sheet of paper, pin in position, and draw round the outline of the back and the front patterns.

Back—

A-B = the length of the garment.
C-D = $\frac{1}{2}$ in.
F-G = $\frac{1}{2}$ in.

Front—

J-K = $\frac{1}{2}$ in.
L-M = *E-G* on the back pattern.
I-N = $\frac{1}{2}$ in.

EXTENSION OF BODICE BLOCK PATTERN

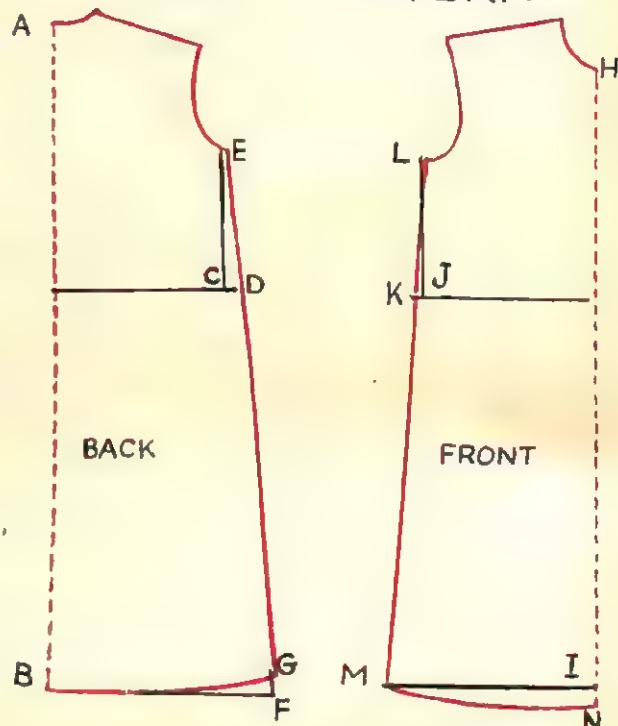


FIG. 2

Princess Petticoat

FROM BODICE BLOCK PATTERN

Place the block patterns on to a large sheet of paper, pin in position, and draw round the outline of the patterns.

Back—

A-C = 1 in.
B-D = 1 in.
E-F = 1 in.
G-H = 1 in.
I-J = $\frac{1}{2}$ in.
A-K = the length of garment from the nape of the neck.
L-M = $\frac{1}{2}$ in.

Front—

A-C = 1 in.
B-D = 1 in.
E-F = 1 in.
G-H = 1 in.
I-J = $\frac{1}{2}$ in.
H-L = *H-L* on the back pattern.
J-M = 3 in. or 4 in.
M-N = 3 in.
K-P = *O-N*.
O-Q = 4 in.
M-R = $\frac{1}{2}$ in.

The line *Q-N* is gathered and set in to the bodice line from *Q-R*.

PRINCESS PETTICOAT

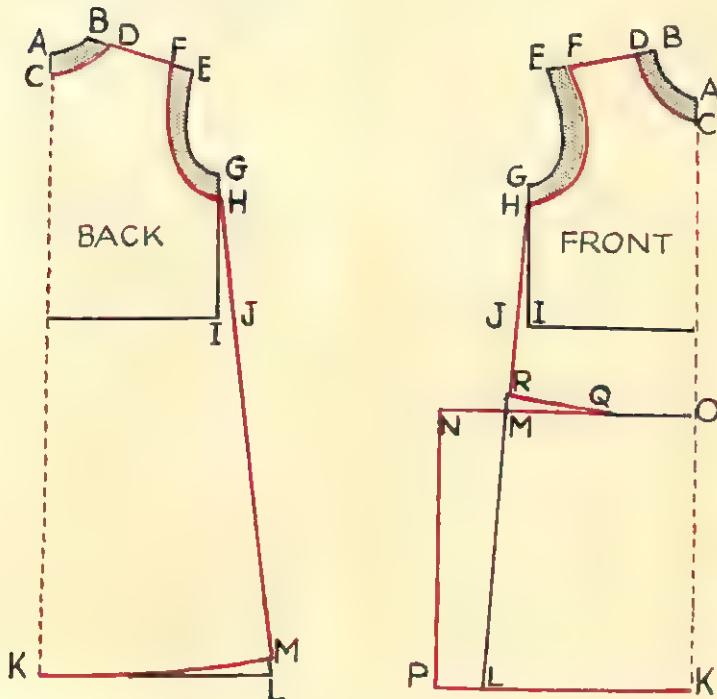


FIG. 3

FOR GIRL OF 12 YEARS: PRINCESS PETTICOAT WORKED TO PROPORTION, WITH BUILT-UP SHOULDER

Bust . . . 32 in.

Back Length . . . 13½ in.

$A-B = \frac{1}{4}$ bust + $\frac{1}{2}$ in.

$A-C = \text{back length} + \frac{1}{2}$ in.

$B-D = \text{back length} + \frac{1}{2}$ in.

Rule in the waist line from C to D.

$A-E = \frac{1}{4}$ bust less $\frac{1}{2}$ in.

$B-F = \frac{1}{4}$ bust less $\frac{1}{2}$ in.

Rule in the bust line from E to F.

$A-G = \frac{1}{4} A$ to E.

$G-H = \frac{1}{2} G$ to E.

$A-I = A$ to G.

Curve in the back neck line from I to G.

Curve in the front neck line from I to H.

$I-J = \frac{1}{4} I$ to B.

$J-K = \frac{3}{4}$ in.

Rule in the shoulder line from I to K.

$H-L = \text{the chest size (6 in.) or } \frac{1}{8} \text{ of the whole bust size.}$

$D-M = \frac{1}{2}$ in.

Rule in the construction seam line from F through M to length required.

$D-N = \frac{1}{2}$ in.

$M-O = 7$ in.

Rule in the shaped under-arm seam line from F to N and from N through O to length required.

$A-P = \text{the full length of garment.}$

Square a line across from P to the shaped seam line mark Q.

$Q-R = \frac{1}{2}$ in.

Curve in the hem line from R to P.

PRINCESS PETTICOAT PATTERN: WORKED TO PROPORTION, WITH SHOULDER STRAPS
Front Pattern.

$A-B = \text{quarter of the bust} + \frac{1}{2}$ in.

$A-C = \text{half the back length from nape to waist.}$

$C-D = A$ to B.

$A-E = \text{half } A$ to B.

$E-F = 1\frac{1}{2}$ in. to $2\frac{1}{2}$ in.

$B-G = 1$ in.

Curve from *F* to *A* and from *F* to *G*.

$$D-H = \frac{1}{2} \text{ in.}$$

$$C-I = 9 \text{ in.}$$

Rule a line from *I* to *J* parallel to the waist line.

$$J-K = 1 \text{ in.}$$

Rule in the under-arm seam line from *G* to *H* and from *H* through *K*.

C-L = the skirt length below the waist.

Rule a line from *L* parallel to the waist line.

$$M-N = \frac{1}{4} \text{ in.}$$

Curve in the hem line from *N* to *L*.

$$C-O = \text{half } C \text{ to } D.$$

$$O-P = 3 \text{ in.}$$

$$O-Q = 4 \text{ in.}$$

Rule in the dart or tuck line from *P* to *Q*.

Back Pattern

This is a repetition of the front pattern.

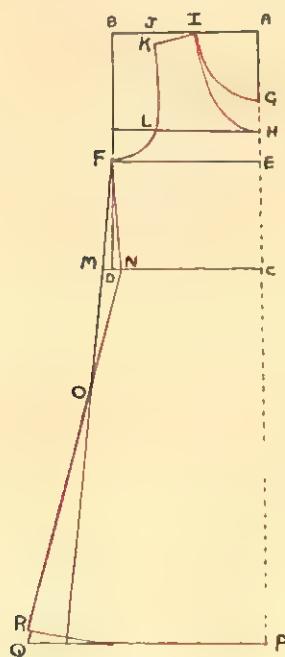


FIG. 4

Princess Petticoat worked to Proportion
with built-up Shoulder

Overall Pattern

This pattern is obtained from the block bodice pattern.

Specimen pattern for girl of 10 years—

Place the block patterns on to a large sheet of paper, pin in position, and draw round the outline of the back and front patterns.

Mark the division lines on the front pattern as in diagram.

Back—

$$A-B = \frac{1}{2} \text{ in.}$$

$$C-D = \frac{1}{2} \text{ in.}$$

A-E = the length of overall.

$$F-G = 1 \text{ in.}$$

$$H-I = \frac{1}{2} \text{ in.}$$

G-J = the under-arm seam.

Front—

$$K-L = \frac{1}{2} \text{ in.}$$

$$M-N = 1\frac{1}{2} \text{ divisions.}$$

$$O-P = 1 \text{ in.}$$

$$Q-R = \frac{1}{2} \text{ in.}$$

P-S = *G-J* on back pattern.

$$T-U = 4 \text{ in.}$$

$$V-W = 4 \text{ in.}$$

For tie belt cut two strips of material selvedge way 24 in. $\times 2\frac{1}{2}$ in.

The under-arm seam on the right-hand side

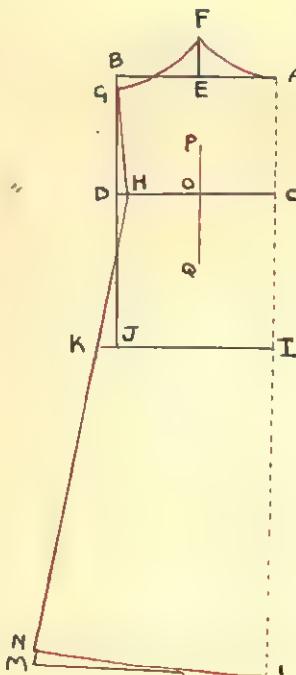


FIG. 5

Princess Petticoat worked to Proportion
with Shoulder Straps

OVERALL PATTERN

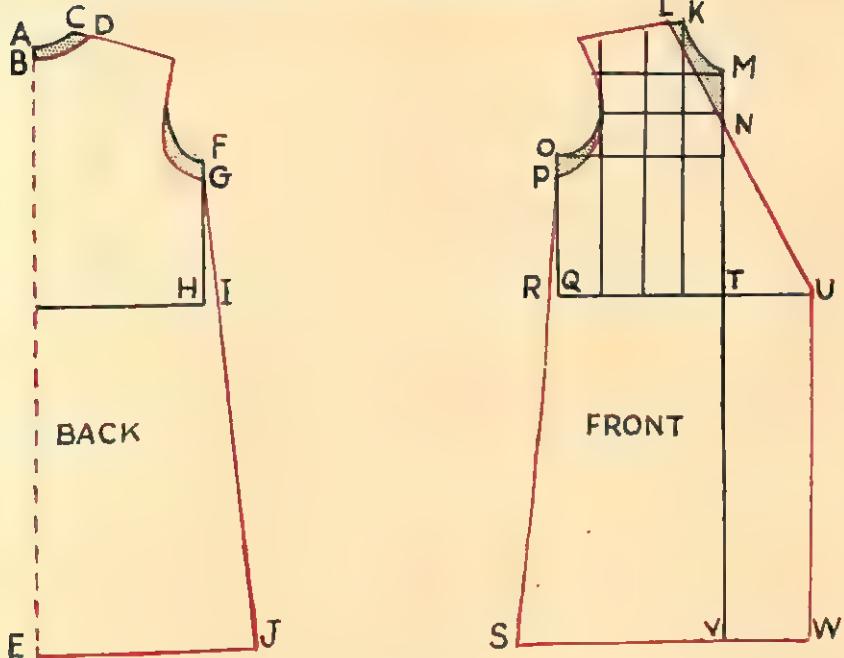


FIG. 6

DUST HOOD OR COOKERY CAP

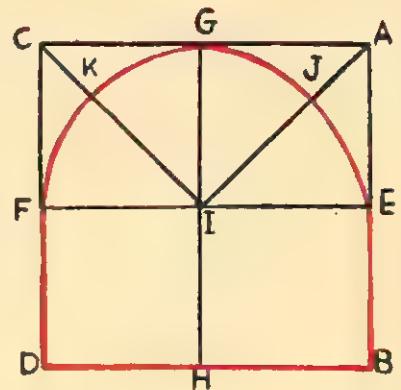
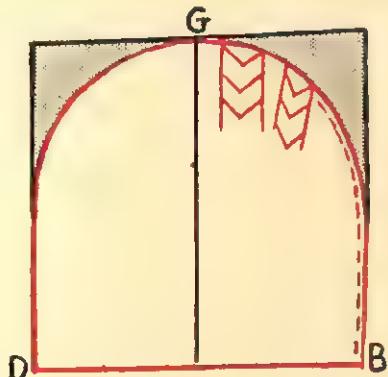
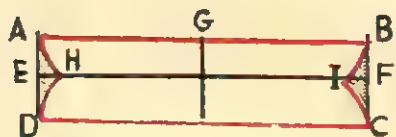


FIG. 7



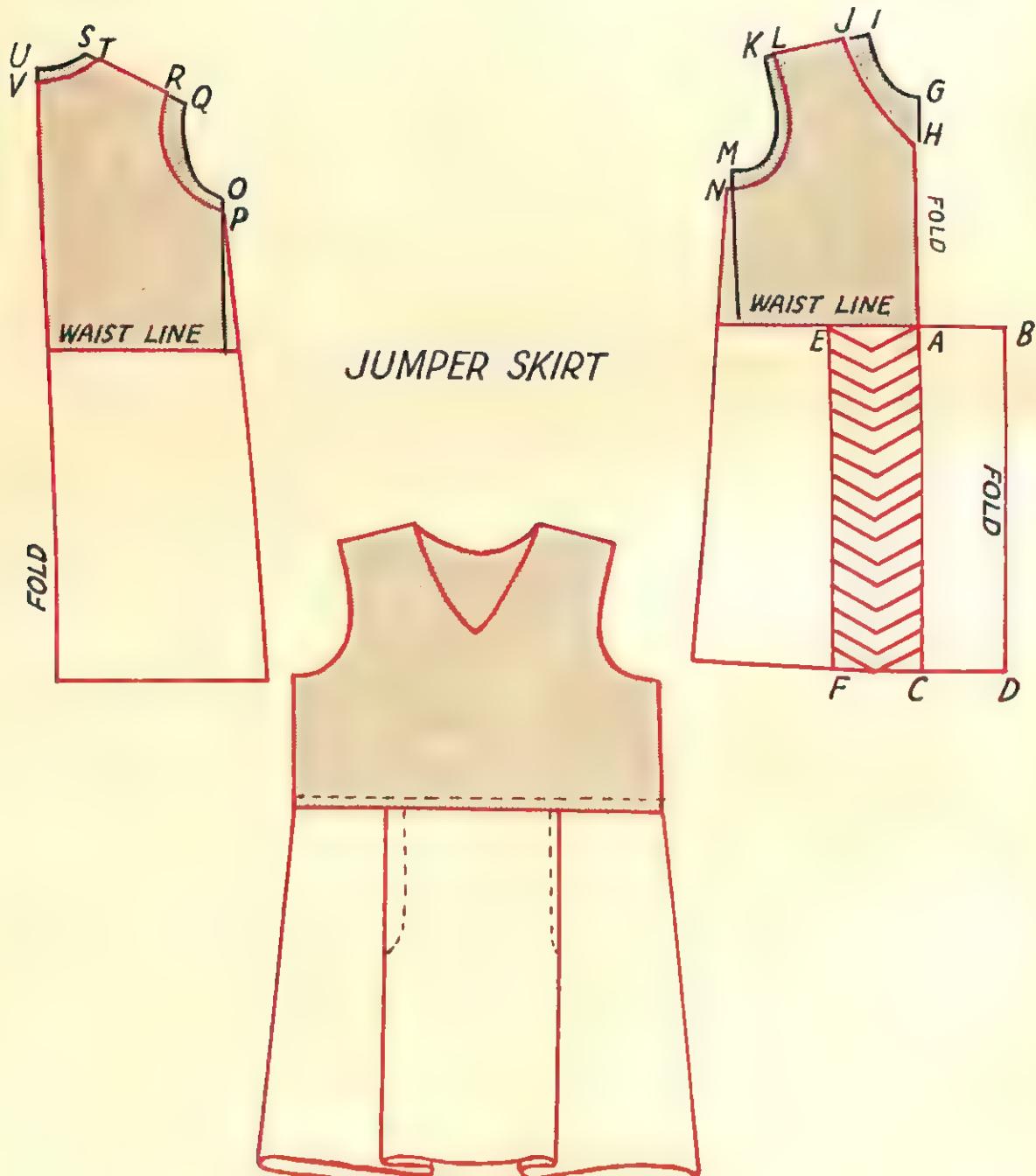


FIG. 8
Jumper Skirt

of the overall is left open for 1 in. on each side of the waist line, to allow the tie belt to pass through.

Patch pocket equals a square of 5 in. This allows for a $\frac{1}{2}$ in. hem on the top edge and $\frac{1}{4}$ in. turnings round the three sides of the pocket. The pocket is sewn on to the right-hand side of the overall just below the waist line.

Dust Hood or Cookery Cap

This pattern is made from a square of paper; the front half of the pattern is equal to half a circle, and the back half of the pattern is an oblong.

$A-B$ = the overhead measurement (see Fig. 7).
 $A-C$ = the overhead measurement.
 $C-D$ = the overhead measurement.
 $A-E$ = $\frac{1}{2} AB$.

$C-F = \frac{1}{2} CD$.
 $A-G = \frac{1}{2} AC$.
 $B-H = \frac{1}{2} BD$.
 I is the centre of the square.
 $I-J = I-E$.
 $I-K = I-E$.

Curve from E through $J-G-K$ to F for the front part of the pattern.

GH is the centre line of pattern.

Band.
 $A-B$ = the round face measurement (see Fig. 7).
 $B-C = 4$ in.
 $A-D = 4$ in.

$A-E = \frac{1}{2} AD$.
 $B-F = \frac{1}{2} BC$.
 $A-G = \frac{1}{2} AB$.
 $E-H = 1$ in.
 $F-I = 1$ in.

Curve from $D-H$ and $H-A$ for the end of the band.

For the position of the pleats and gathers see Fig. 7.

The line $B-G$ on the hood is set into the line $B-G$ on the band.

The line $B-D$ on the hood is finished with a $\frac{1}{2}$ in. hem.

A length of elastic equal to $\frac{1}{2} BD$ is inserted in the hem and fastened off at each end before setting on the band.

Jumper Skirt

This pattern is obtained from the extended block pattern. Place the extended block pattern

on a large sheet of paper. Pin in position and draw round the outline of the back and front patterns.

Front Pattern

$A-B = 4$ in. or the width required for the pleat.

$C-D = A-B$.

Rule in the centre front line from $B-D$.

$A-E = A-B$.

$C-F = A-B$.

Rule in the pleat line from $E-F$.

To fix the pleat, fold the line $A-C$ to the line $E-F$.

$G-H = 2\frac{1}{2}$ in.

$I-J = 1$ in.

Curve in the front neck line from $J-H$.

$K-L = 1$ in.

$M-N = 1$ in.

Curve in the armhole from $L-N$.

Back Pattern

$O-P = 1$ in.

$Q-R = 1$ in.

Curve in the armhole from $R-P$.

$S-T = 1$ in.

$U-V = 1$ in.

Curve in the back neck line from $T-V$.

The bodice section of this garment is cut out in lining, and the skirt section is cut out in material.

Finish the skirt with pressed-open seams. Cut a strip of lining $1\frac{1}{2}$ in. wide and with this bind the waist edge of the skirt.

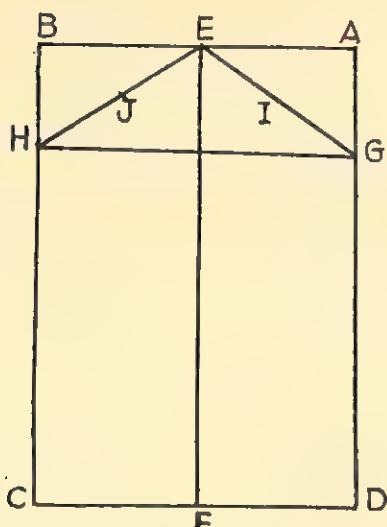
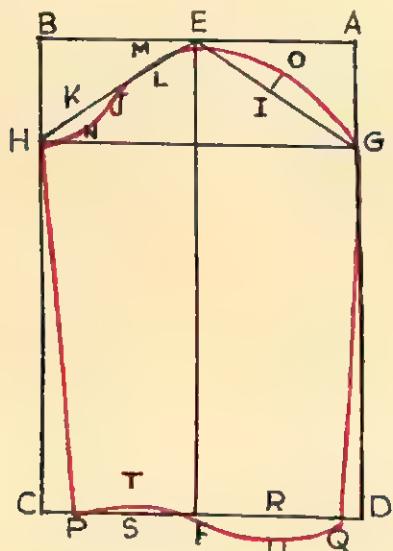
Make up the lining bodice, using French seams. Fix, tack, and machine a 1 in. hem on the waist edge.

Mark the centre back and front of the bodice and of the skirt with coloured tacking. Fix the waist edges together and stitch with firm tacking. This allows the bodice to be made of washing material.

Sleeve Pattern

Average sizes for sleeve patterns—

Age of Girl	Size of Oblong		Shaping
	Length In.	Width In.	
11 to 12 yr.	20	13	4
12 to 14 yr.	22	14	5

FIG. 9
Sleeve Pattern

Specimen pattern for girl 11 years old—
Cut an oblong of paper 20 in. \times 13 in.
Mark the corners ABCD as in Fig. 9.

A-B = the width of sleeve.*A-D* = the length of sleeve.*A-E* = $\frac{1}{2}$ *AB*.*C-F* = $\frac{1}{2}$ *CD*.*A-G* = amount of shaping.*B-H* = amount of shaping.*E-I* = $\frac{1}{2}$ *EG*.*E-J* = $\frac{1}{2}$ *EH*.*H-K* = $\frac{1}{2}$ *HJ*.*E-L* = $\frac{1}{2}$ *EJ*.*L-M* = $\frac{1}{4}$ in.*K-N* = $\frac{1}{2}$ in.Curve from *H* through *NJM* to *E* for the front part of sleeve.*I-O* = 1 in.Curve from *E* through *O* to *G* for the back part of sleeve.*C-P* = 1 in.*D-Q* = 1 in.*Q-R* = $\frac{1}{2}$ *Q-F*.*P-S* = $\frac{1}{2}$ *P-F*.*S-T* = $\frac{1}{2}$ in.*R-U* = $\frac{1}{2}$ in.Curve from *P* through *TFU* to *Q* for the lower edge of sleeve.

The seam of this sleeve is arranged to fit to the under-arm seam of the garment.

To fix the sleeve in position on a garment, pin the under-arm seams together and work round the armhole, keeping the fitting lines together and holding the sleeve over the bodice. This ensures the sleeve's being eased into the arm-hole. Tack the sleeve firmly and machine; then neaten by overcasting the two edges together.

Girl Guide Uniform Dress

This pattern is obtained from the extended block bodice patterns. Place the extended block patterns on a large sheet of paper. Pin in position and draw round the outline of the back and front patterns, marking in the waist and bust lines.

Back Pattern

A is the side waist.
B-C = $1\frac{1}{2}$ in. This is to provide extra width in the skirt.
 Rule from *A-C* for the side seam line.

Front Pattern

D is the side waist.
E-F = $1\frac{1}{2}$ in.
 Rule in the side seam line from *D-F*.

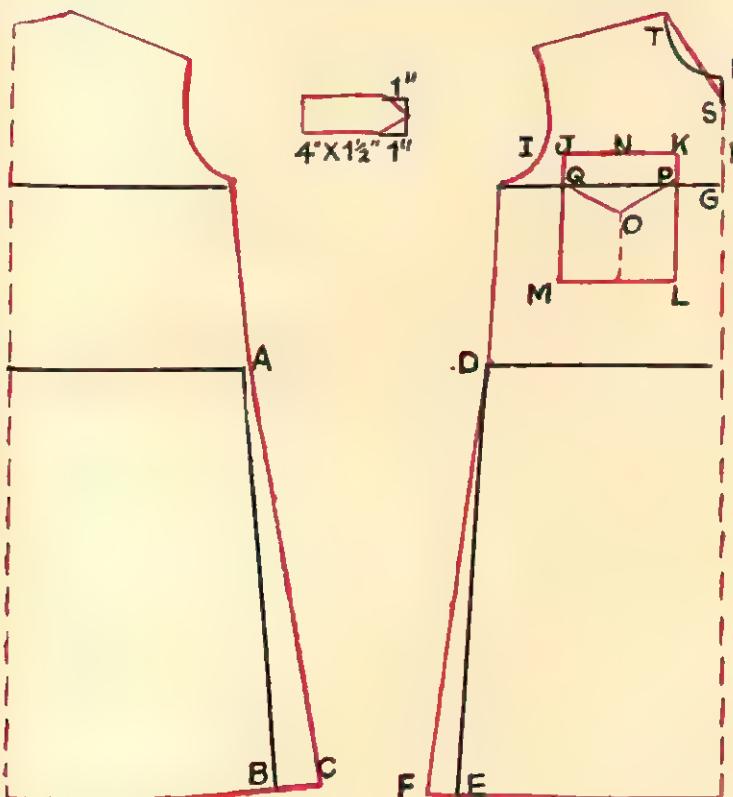
GIRL GUIDE UNIFORM DRESS

FIG. 10

Pocket Pattern

Cut a piece of material $6\frac{1}{2}$ in. \times 7 in.
 Fold it to make an oblong $6\frac{1}{2}$ in. \times $3\frac{1}{2}$ in.
 Tack 1 in. in from the fold edge and machine a tuck 1 in. wide.

Press the tuck open to form a box pleat.

To Mark Position for the Pocket

G-H = 1 in.

Rule from *H-I* for the pocket line.

I-J = 1 in.

J-K = $4\frac{1}{2}$ in., or the width of the pocket.

K-L = $5\frac{1}{2}$ in., or the depth of the pocket.

J-M = *K-L*.

J-N = $\frac{1}{2}$ *JK*.

N-O = 2 in.

K-P = 1 in.

J-Q = 1 in.

For New Neck Line

R-S = 1 in.

Curve in the new neck line from *T-S*.

S-G = length of the front opening.

Sleeve Pattern

Draft the sleeve pattern according to previous instructions.

Age of Child	Size of Oblong	Shaping
11 to 12 yr.	20 in. less depth of cuff \times 13 in.	4 in.
12 to 16 yr.	22 in. less depth of cuff \times 14 in.	5 in.

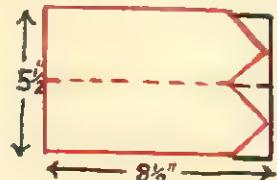
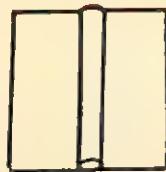
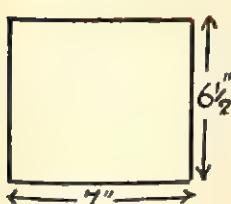


FIG. 11
Pocket

FIG. 12
Cuff

Cuff Pattern

Cut a piece of paper $8\frac{1}{2}$ in. $\times 5\frac{1}{2}$ in.
Shape for pointed end as in diagram.

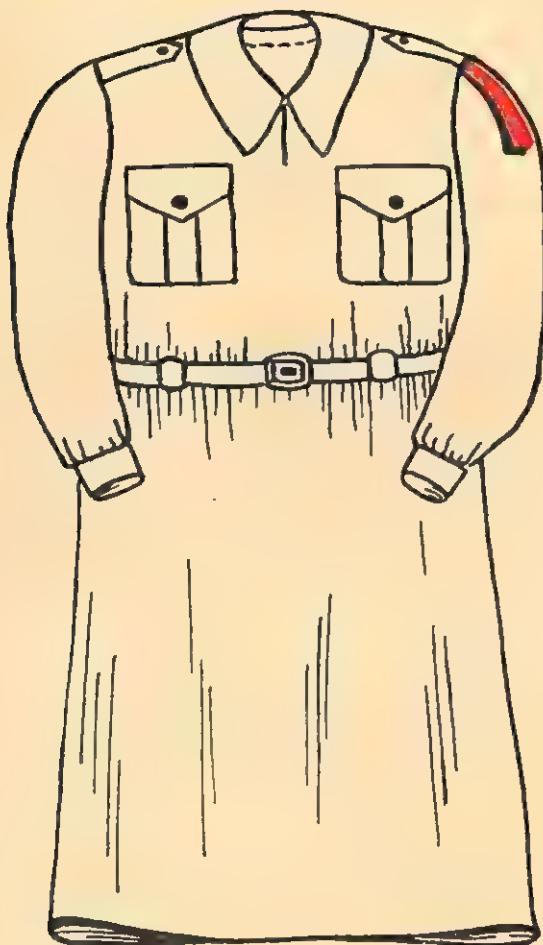


FIG. 13

Collar Pattern

Use the Eton collar pattern drafted according to instructions in p. 119.

*Drill Tunic**Yoke Pattern*

This pattern is obtained from the block bodice pattern.

Front

Pin the front block pattern on to a sheet of paper and draw round the outline of the pattern.

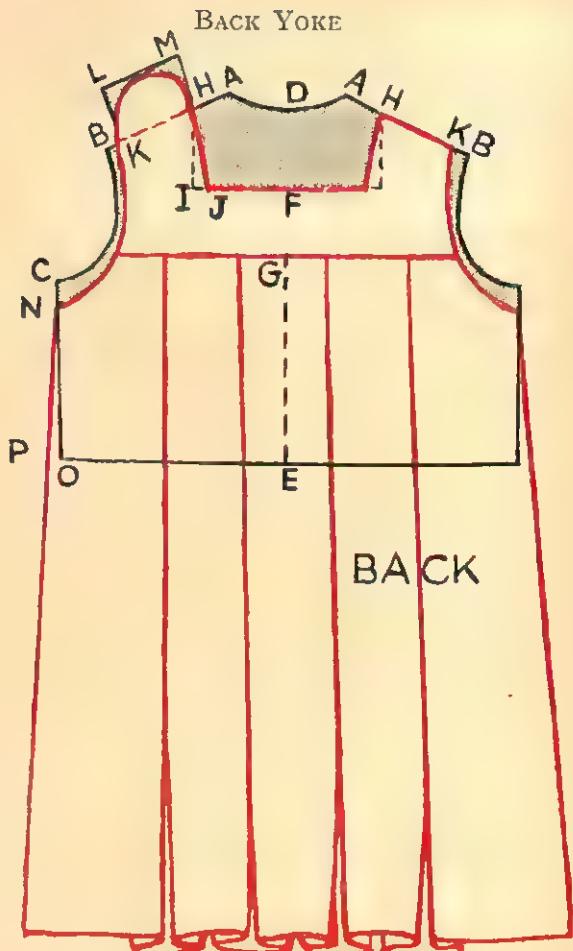
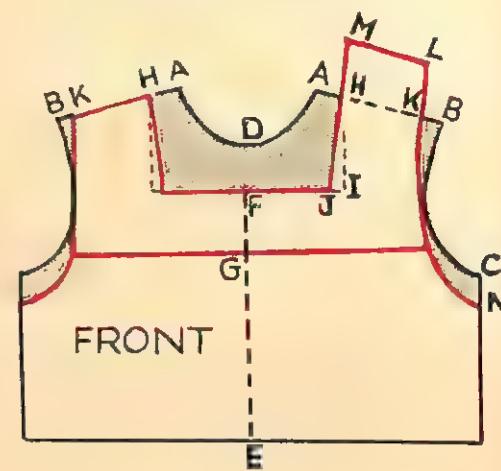
DRILL TUNIC FRONT YOKE

FIG. 14

A-B = the block-pattern shoulder lines.

D-E = the centre front.

D-F = 2 in.

F-G = $2\frac{1}{2}$ in., or the depth of yoke required.

A-H = $1\frac{1}{2}$ in.

Rule in a dotted line through *H* parallel to the centre-front line.

H-I = the depth of yoke.

I-J = $\frac{1}{2}$ in.

B-K = $\frac{1}{2}$ in.

K-L = 2 in.

H-M = 2 in.

This provides a wrap for the fastening of the tunic.

Rule in the right-hand shoulder line from *H-K* as in Fig. 14.

C-N = 1 in.

Curve the new armhole line from *K-N*.

Back

A-B = the block-pattern shoulder lines.

D-E = the centre back.

D-F = 3 in.

F-G = $2\frac{1}{2}$ in. or the depth of the yoke.

A-H = $1\frac{1}{2}$ in.

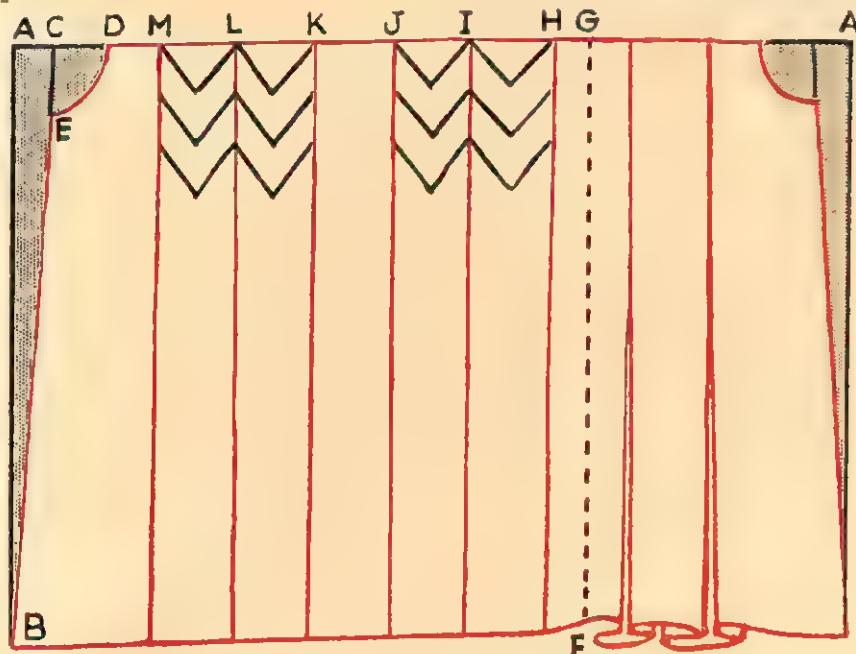


FIG. 15
Drill Tunic Skirt Section

Rule a dotted line through *H* parallel to the centre-back line.

H-I = the depth of yoke.

I-J = $\frac{1}{2}$ in.

B-K = $\frac{1}{2}$ in.

K-L = 2 in.

H-M = 2 in. Curve in the shoulder end as in diagram.

C-N = 1 in. Curve in the new armhole line from *K-N*.

O-P = $\frac{1}{2}$ in.

Rule in the side seam line from *N* through *P* to the length required for the block tunic pattern.

Skirt Section

A-B = the length of skirt section.

A-C = $1\frac{1}{2}$ in.

C-D = 2 in.

C-E = $2\frac{1}{2}$ in.

Rule in the sloping seam line from *C-B*.

Curve in the armhole shaping from *D-E*.

D-G = $\frac{1}{2}$ the size of the yoke plus the amount required for pleats, e.g. 12 in.

F-G = centre front of skirt section.

G-H = $\frac{1}{2}$ the width of the box pleat, e.g. $1\frac{1}{2}$ in.

H-I = 3 in. for the width of one pleat.

I-J = 3 in. for the width of one pleat.

J-K = 3 in. for the width of the box pleat.

K-L = 3 in. for the width of one pleat.

L-M = 3 in. for the width of one pleat.

M-D = the remainder of skirt.

The letter *G* on the skirt section is placed to the letter *G* on the back and front yokes.

Swimming Costume

This pattern is obtained from the front block pattern. Specimen pattern for girl of 11 years—

Height 4 ft. 4 in.

Bust 31 in.

Back length 13 in.

Place the front block pattern on to a large sheet of paper, pin in position, and draw round the outline of the pattern. Mark the division lines as in the diagram.

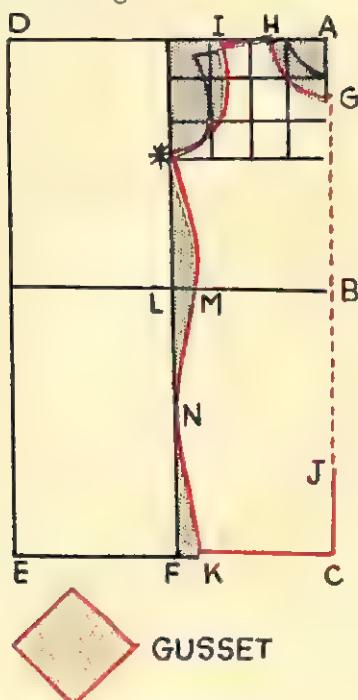


FIG. 16

Extend the line *AB* for the length of the garment = to $\frac{1}{2}$ the height + 2 in.

A-C = the length of the garment.

D-E = the length of the garment.

Extend the line from the * to the length of the garment.

*-*F* = the under-arm seam line.

A-G = $1\frac{1}{2}$ divisions.

A-H = $1\frac{1}{2}$ divisions.

H-I = the length of the shoulder, 2 in.-3 in.

C-J = 4 in.

F-K = 1 in.

L-M = 1 in.

L-N = $\frac{1}{2}$ LF.

To Cut Out the Pattern

Fold the oblong widthways into two equal divisions. Pin the two layers of paper together to keep in position.

Cut through the double paper round all the pattern lines. This will give 2 patterns, half the front and half the back.

To plan out the patterns on to the material place the centre front and back patterns to a fold of material.

Cut up the folds from *C-J* on both the back and the front of the garment, and insert the gusset.

The gusset is a square of 3 in.

Set in the gusset with a corner of the gusset to point *J* on the garment.

Magyar Pattern

Specimen pattern for girl of 11 years—

Height 4 ft. 4 in.

Bust 31 in.

Back length 13 in.

A-B = $\frac{1}{2}$ of the bust + 1 in.

A-C = the back length + $\frac{1}{2}$ in.

A-D = the full length + $\frac{1}{2}$ in.

A-E = $2\frac{1}{4}$ in.

A-F = $2\frac{1}{2}$ in. for front neck shaping.

A-G = $\frac{1}{2}$ in. for back neck shaping.

B-H = $1\frac{1}{2}$ in.

E-I = the length of the sleeve from the neck across the shoulder to the length required.

Rule a line at right angles to *IE*.

I-J = the width of the sleeve.

H-L = $\frac{1}{2}$ *HK*.

L-M = $1\frac{1}{2}$ in.

L-N = $1\frac{1}{2}$ in.

K-O = $\frac{1}{2}$ in.

Curve in the sleeve seam from *J* through *N* to *M*.

Rule in the under-arm seam line from *M* through *O* to the length of the garment required.

D-P = the dress hem line.

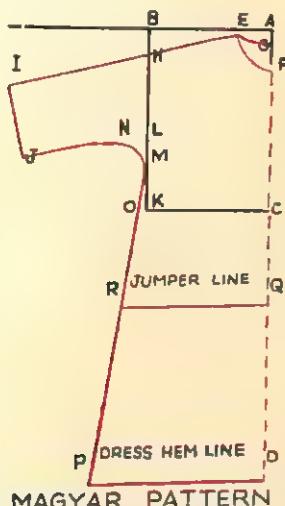


FIG. 17

Jumper Pattern

G-Q = length of the jumper from the nape of the neck.

Q-R = the jumper line.

Nightdress Pattern

Extend the line *GD* to the length of the night-dress ($\frac{7}{8}$ of the height).

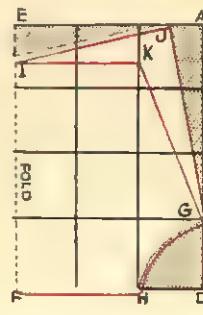
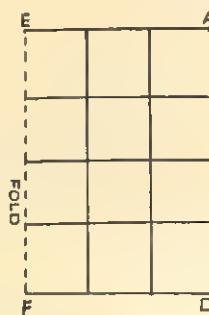
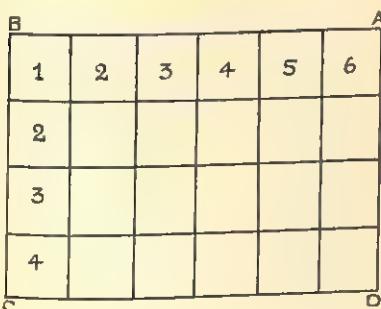


FIG. 18
Knicker Pattern

Rule from *I-J* for the back waist line.

K = 1 division on from *A* and $\frac{1}{2}$ division down.

Rule from *I-K* for the front waist line.

Rule from *G-J* for the back seam line.

Rule from *G-K* for the front seam line.

To Cut Out the Pattern.

Pin the two layers of paper together to keep in position.

Cut through the double paper from *H* through *G* and *J* to *I* for the back portion of the pattern.

Take out the pins and open out the pattern.

Cut through the single paper from *G* through *K* to *I* for the front portion of the pattern.

Girl's Pyjamas

Trousers

Specimen pattern for a girl of 11 years is given here.

Pin the knicker pattern on to a large sheet of paper, draw round the outline of the pattern, mark the centre-fold line, and then remove the pattern.

PYJAMA SUIT PATTERN

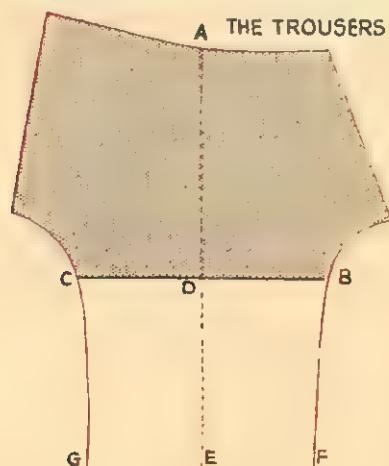


Fig. 19

A-D is the centre line of the knickers.

A-E = the full length of the trousers ($\frac{5}{8}$ of the height).

E-F = *D-B* less 1 in.

E-G = *D-C* less 1 in.

Magyar Jumper

The magyar pattern suitable for this garment is given in Fig. 17.

Flared Skirt Pattern

Rule a right angle to the right-hand side of the paper, and mark the corner *A*.

A-B = 3 in.

A-C = $\frac{1}{2}$ waist measure less 1 in.

C-D = $\frac{1}{4}$ waist measure less 1 in.

D-E = $\frac{1}{4}$ waist measure less 1 in.

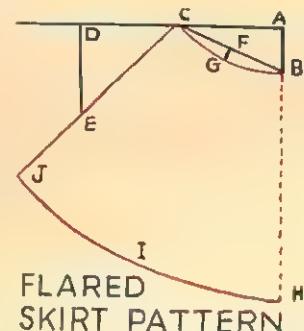


FIG. 20

Rule a construction line from *B-C*.

B-F = $\frac{1}{2} BC$.

F-G = 1 in.

Curve in the waist line from *C* through *G* to *B*.

Rule in the side seam line from *C* through *E* to the length of the skirt required.

C-J = length of the skirt.

G-I = length of the skirt.

B-H = length of the skirt.

Collars and Cuffs

ETON COLLAR

Cut out an oblong of paper the neck size + 5 in. \times the depth of collar required + $1\frac{1}{2}$ in. (19 in. \times 5 in.).

Fold to make an oblong 5 in. \times $9\frac{1}{2}$ in.

Mark the corners, *A*, *B*, *D*, *C*

A-E = $1\frac{1}{4}$ in.

A-F = half the required neck size (7 in.).

Rule a dotted line from *E* to *F*.

E-G = half *E-F*.

G-H = $\frac{1}{4}$ in.

Curve in the neck line from *F* through *H* to *E*.
D-I = 1 in.

Rule in the front edge of collar from *F* to *I*.
 Curve in the outer edge of collar from *I* to *C*.

COLLAR FOR V NECK

Cut an oblong of paper the neck size required
 $+ 5$ in. \times the depth of collar $+ 2$ in. (26 in. \times
 $5\frac{1}{2}$ in.).

Fold to make an oblong $5\frac{1}{2}$ in. \times 13 in.

Mark the corners *A*, *B*, *D*, *C*.

A-E = 2 in.

A-F = half required neck size ($10\frac{1}{2}$ in.).

Rule a dotted line from *E* to *F*.

E-G = half *E* to *F*.

G-H = $\frac{1}{2}$ in.

Curve in the neck line from *F* through *H* to *E*.

D-I = $1\frac{3}{4}$ in.

Rule in the front edge of collar from *F* to *I*.

Curve in the outer edge of collar from *I* to *C*.

TIE COLLAR FOR V NECK

Cut an oblong of paper the required neck size
 $+ 1\frac{1}{2}$ in. \times the depth of the collar $+ 2\frac{1}{4}$ in.
 (24 in. \times $6\frac{1}{2}$ in.).

Fold to make an oblong $6\frac{1}{2}$ in. \times 12 in.

Mark the corners *A*, *B*, *D*, *C*.

A-E = $2\frac{1}{4}$ in.

A-F = half the required neck size $11\frac{1}{4}$ in.

Rule in a dotted line from *F* to *E*.

E-G = half *E* to *F*.

G-H = $\frac{1}{2}$ in.

Curve in the neck edge of collar from *F* through *H* to *E*.

Rule a line from *G* at right angles to the line *FE*.

G-I = 4 in.

B-J = $1\frac{1}{2}$ in.

Rule in the tie end of collar from *F* to *J*.

Curve in the outer edge of collar from *J* through *I* to *C*.

TAILOR COLLAR

Cut an oblong of paper the required neck size \times the depth of collar (15 in. \times $3\frac{1}{2}$ in.).

Fold to make an oblong $3\frac{1}{2}$ in. \times $7\frac{1}{2}$ in.

Mark the corners *A*, *B*, *D*, *C*.

B-E = $1\frac{1}{2}$ in.

Curve from *E* to *A* for the neck edge of collar.

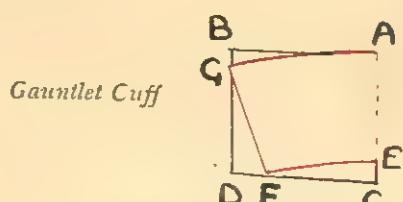
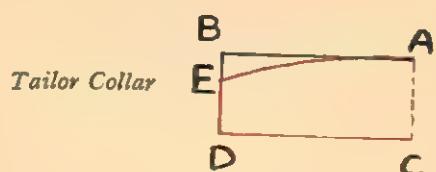
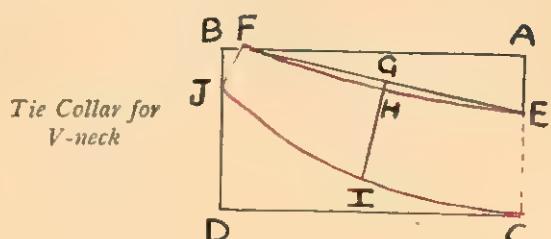
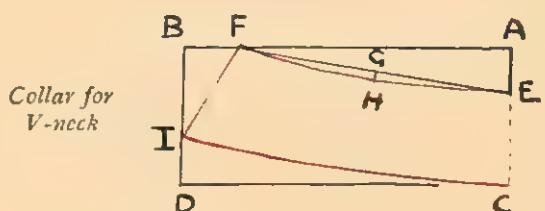
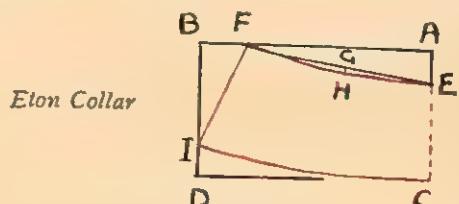


FIG. 21

TURNED BACK CUFF

Cut an oblong of paper the wrist size + 2 in.
 \times the depth of cuff + $\frac{1}{2}$ in. (10 in. \times 3 in.).

Fold to make an oblong 3 in. \times 5 in.

Mark the corners A, B, D, C.

C-E = $\frac{1}{2}$ in.

C-F = half wrist size, 4 in.

Curve in the wrist edge of cuff from E to F.

B-G = $\frac{1}{2}$ in.

Rule in the cuff end from G to F.

Curve in the outer edge of cuff from A to G.

GAUNTLET CUFF

Cut an oblong of paper wrist size + 3 in. \times
 depth of cuff + $\frac{3}{4}$ in. (11 in. \times 5 in.).

Fold to make an oblong 5 in. \times $5\frac{1}{2}$ in.

Mark the corners A, B, D, C.

C-E = $\frac{3}{4}$ in.

C-F = half wrist size, 4 in.

Curve in the wrist line from E to F.

B-G = $\frac{3}{4}$ in.

Rule in the end of cuff from G to F.

Curve in the outer edge of cuff from A to G.

ELEMENTS OF NEEDLECRAFT

NEEDLEWORK PROCESSES

Temporary and Constructive Stitches

The following are used in the making up of garments—

TEMPORARY STITCHES

1. EVEN TACKING STITCH is used for fixing seams, tucks, hems, etc., in preparation for the constructive stitches.
2. LONG AND SHORT TACKING is used when dealing with woollen or any stubborn material.
3. UPRIGHT TACKING STITCH is used for setting gathers into a band.
4. THREAD TACKING is used to mark out fitting lines through double material.

FIG. 1

FIG. 2

3. SEAMING is used for joining two pieces of material together. It is worked from right to left.

4. HEMMING is used for fastening down edges. It is worked from right to left. The whole stitch forms a V of which one stroke shows as a diagonal stitch on the right side and the other as a diagonal stitch on the wrong side.

5. BACK STITCHING is used for joining two thicknesses of material when a strong joining is required, e.g. for setting on a tape. It is worked from right to left.

6. LOOP STITCHING is used for scalloping and for neatening the raw edges of a garment. If worked to a design it may be used for decorative purposes. It is worked from left to right.

7. HERRING-BONE STITCH is used when making flannel garments, for neatening seams and edges. It is worked from left to right.

8. OVERCASTING is used for neatening the raw edges of woollen material. It is worked from left to right.

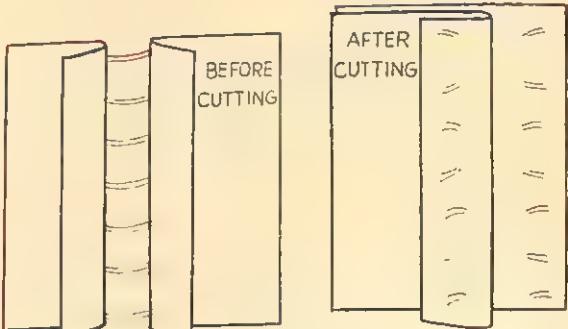
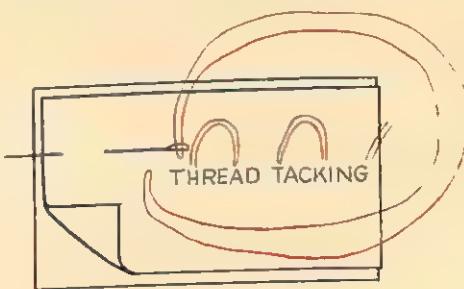
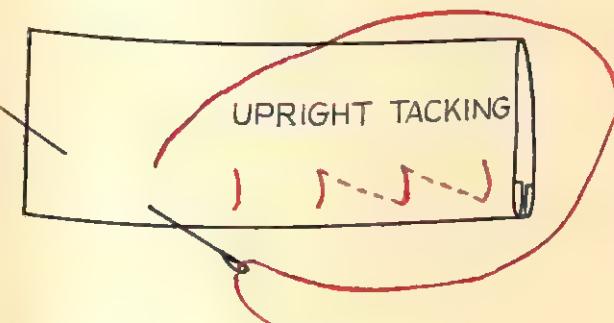
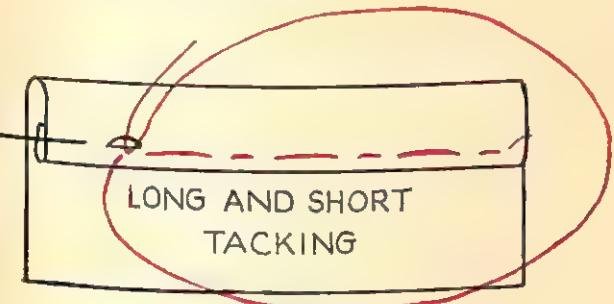


FIG. 3

CONSTRUCTIVE STITCHES

1. RUNNING STITCH is a straight, even stitch with spaces and stitches $\frac{1}{2}$ to $\frac{1}{4}$ in. in length, according to the thickness of the material.

2. GATHERING is used where fullness is required. It is worked from right to left, with stitches equal to twice the spaces, e.g. two threads are taken up and four threads passed over.

9. BUTTONHOLE STITCH is used when making a buttonhole. It is worked from left to right over a double edge of material.

MACHINING

Always keep the machine well oiled and free from dust.

THE PRACTICAL SENIOR TEACHER

Always set the size of the stitch and the tension according to the thickness of the material being used. For a fine material use a small stitch, for a heavy material use a longer stitch.

Always tack all seams before machining.

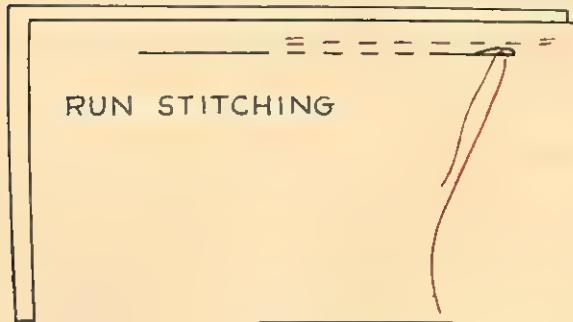


FIG. 4

Special Hints for Schools. (On card for hanging.) Free on application.

Practical Needlework for Schoolgirls. Free on application.

Paper Patterns of Schoolgirl's Outfit, illus-



FIG. 5

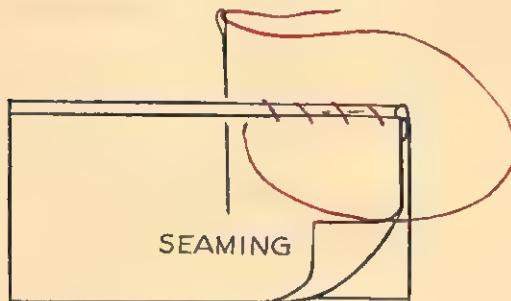


FIG. 6

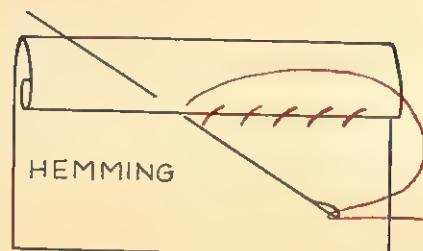


FIG. 7

Always machine circular parts, such as arm-holes, etc., from the inside.

If a bias edge is being machined to a straight edge, place the one most likely to stretch underneath so that the presser foot will not push against the material which is on the bias and so cause a gathered appearance.

Always keep the bulk of the material or the garment to the left-hand side of the machine to prevent its being crushed.

To fasten off machining draw the end through to the wrong side of the garment, thread each end through a sewing needle, and fasten off with a back stitch.

Cut off the remaining thread.

The following Pamphlets and Charts issued by Singer Sewing Machine Company, Ltd., Educational Department, Singer Building, 1-9 City Road, London, E.C.1, should be useful to Teachers of Needlecraft Subjects—

trated in the above-mentioned booklet. Complete Set, 1s. 6d.

Darning Leaflet. Free on application.

Wall Charts illustrating Oiling, Threading, etc. Free to Schools on application.

Small Cards as above for children's own use. Free on application.

Special short Courses of Lessons are available, on application, for Teachers interested in machine work as applied to modern Needlework. These Courses or "Study Groups" are free to those wishing to promote the teaching of Home Sewing and to foster the love of Needlecraft; Proficiency Certificates are awarded to those qualifying, according to the Grade of Course taken.

In view of the fact that the above pamphlets, etc., are available for teachers' use, it is suggested that machining can be attempted during the last year of the Senior School. In this case

the Drill Tunic and Guide Uniform, the patterns of which have been already given in the Pattern Making Section, would be quite suitable and practicable garments to be made by the older Senior girls.

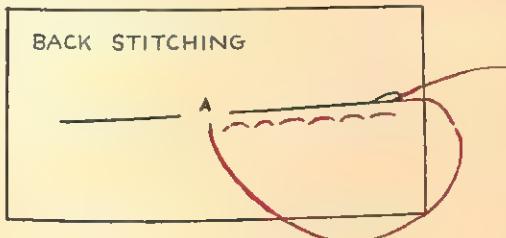


FIG. 8

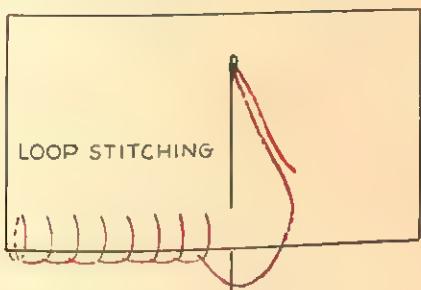


FIG. 9

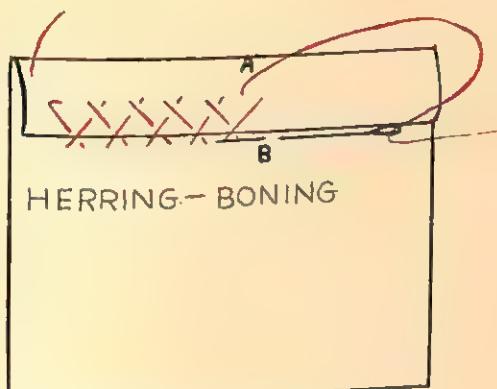


FIG. 10

MACHINED SEAM

A machined seam is a flat seam which takes the place of a run-and-fell when the garment is made by machine.

Method of Working. Place the two wrong sides together with the front edge of the garment $\frac{1}{8}$ in. above the back edge of the garment.

Pin to keep in position. Turn the front edge of the garment over the back edge of the garment and tack into place, being careful to keep the fold edge straight. Turn the seam over to the front side and machine $\frac{1}{8}$ in. from the fold edge.

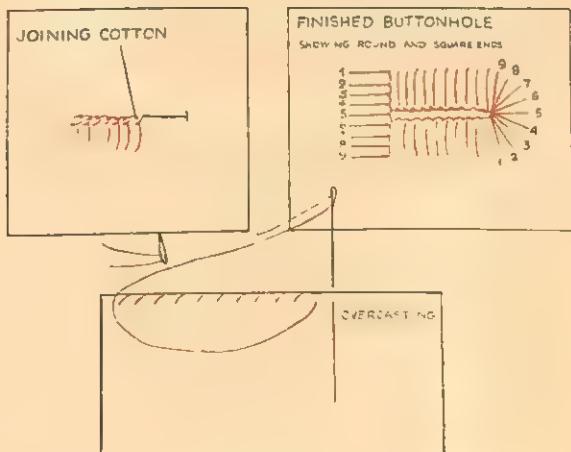
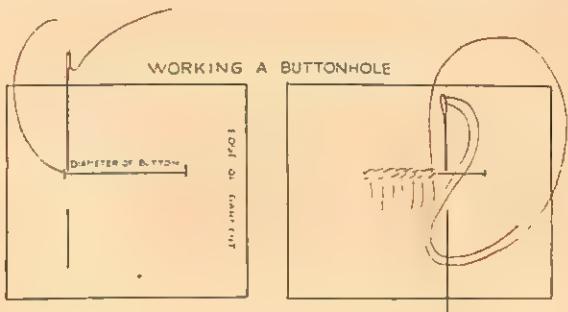


FIG. II

When the machining is completed, open out the work, lay the fell down on to the material, and tack into place. Machine close to the fold edge of the fell from the right side of the garment. When the fell is finished it should fall towards the back of the garment (see Fig. 12).

PLAIN PRESSED OPEN SEAM

Method of Working. Place the two right sides of the material together and tack through the two fitting lines. Machine on the fitting line and then withdraw the tacking threads. Press the machine stitching, fold back the turnings and press open.

The raw edges of the turnings are then made neat by—

1. Overcasting.
2. Loop stitching.

Openings

CONTINUOUS PLACKET

This is a strong method of finishing an opening.

One part of the added piece is folded on to the wrong side of the garment, and the other part is left to form a wrap.

FALSE HEM AND FALSE PIECE

For False Hem. Cut a strip of material, selvedge way, the length of the opening plus 1 in. by $1\frac{1}{2}$ in.; e.g. for length of the opening at side of knickers 6 in., cut false hem 7 in. by $1\frac{1}{2}$ in.

For False Piece. Cut a strip of material,

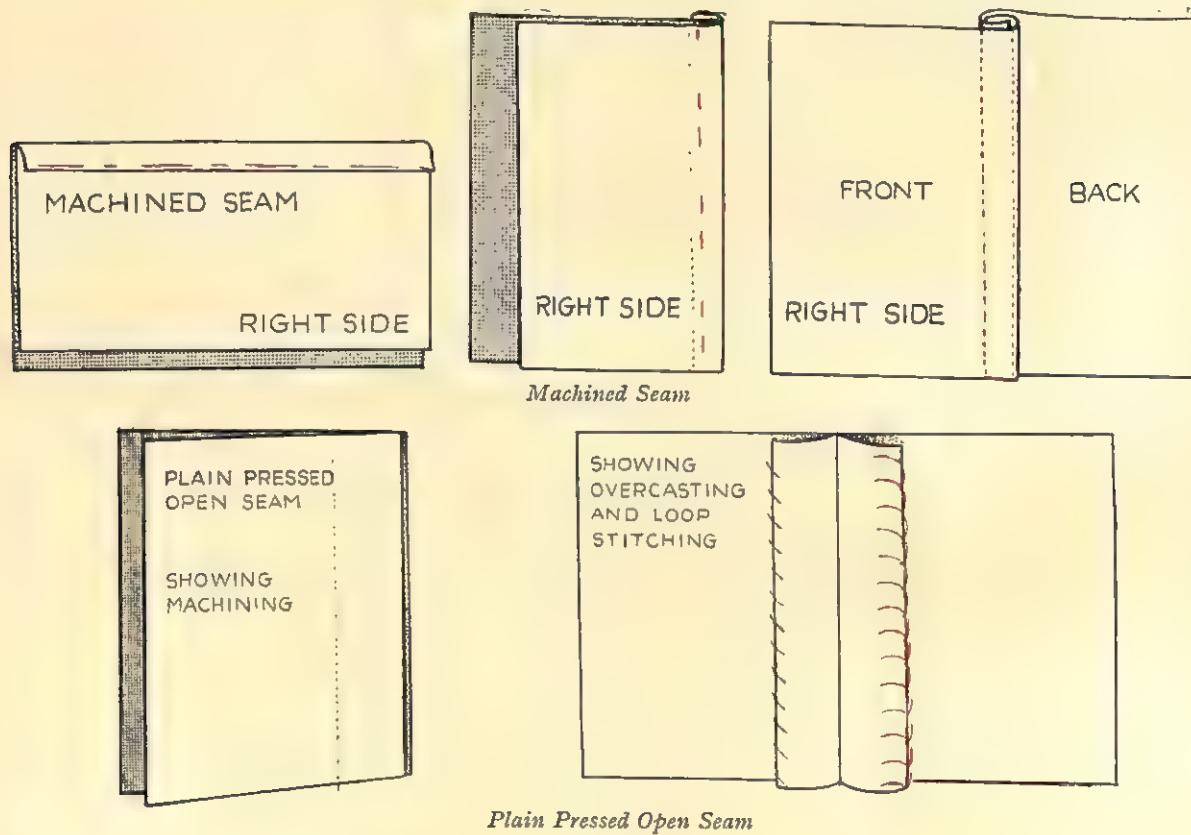


FIG. 12

Method of Working. Cut a strip of material selvedge way, twice the length of the opening and twice the width of the finished strip plus the width of two turnings. Place the right side of the strip to the right side of the garment. Run stitch or machine together (see Fig. 13). Turn and tack a narrow fold on to the wrong side of the strip. Fix this fold to the running stitches. Tack into position and hem along the edge.

selvedge way, the length of the opening plus $1\frac{1}{2}$ in. by $2\frac{1}{2}$ in.; e.g. for length of opening 6 in. cut the false piece $7\frac{1}{2}$ in. by $2\frac{1}{2}$ in. The false hem is used on the top side of the opening and the false piece forms a wrap 1 in. wide on the under side of the garment.

Place the right side of the false hem to the right side of the garment. Tack into position and run stitch or machine together (see Fig. 14). Place the right side of the false piece to the right

side of the garment. Tack into position and run stitch or machine together.

Cut across the width of the turnings to the stitching at the bottom of the opening (see Fig. 14).

Turn the false hem over on to the wrong side. Press the seam well with the finger and thumb, keeping the two edges together. Turn and tack a single fold on to the wrong side of the strip. Tack the false hem into position and hem along the edge.

Turn and tack a single fold on to the wrong side of the false piece. Fix this fold edge to the running stitches. Tack into position and hem along the edge. Fix the seam edge of the false piece to the seam edge of the false hem and pin into position. This forms a small pleat at the bottom of the opening. Back stitch or seam across the bottom of the opening $\frac{1}{4}$ in. above the cut (see Fig. 14).

Turn to the wrong side of the garment. Cut away the under part of the false piece to reduce the thickness.

Turn in the bottom edge of the false piece and hem neatly round the three sides.

This method of finishing an opening with a false hem and false piece may be reversed. In this case the false piece is on the top side and may be finished with a point at the bottom.

Methods of Neatening Edges

FALSE HEM

A false hem is an added strip of material used to neaten a garment.

Method of Working. Place the right side of the false piece to the right side of garment. Pin the two raw edges together and tack into position. Run stitch or machine $\frac{1}{4}$ in. away from the raw edges. If it is a shaped edge snip the turnings almost to the stitching, and turn the whole of the false piece over on to the wrong side of the garment. Fix the false piece to make a hem the required width. Tack into position and hem to the garment.

FACING

A facing is an added piece of material applied to a garment for neatening and trimming purposes.

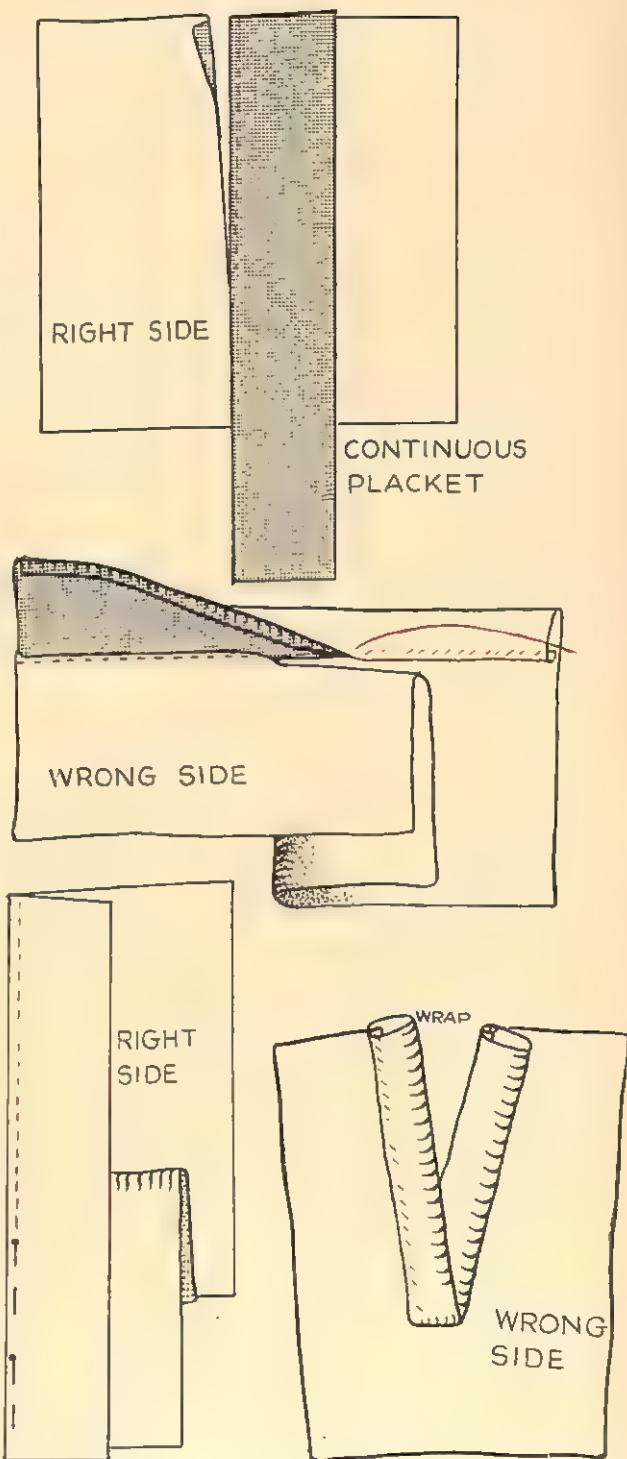
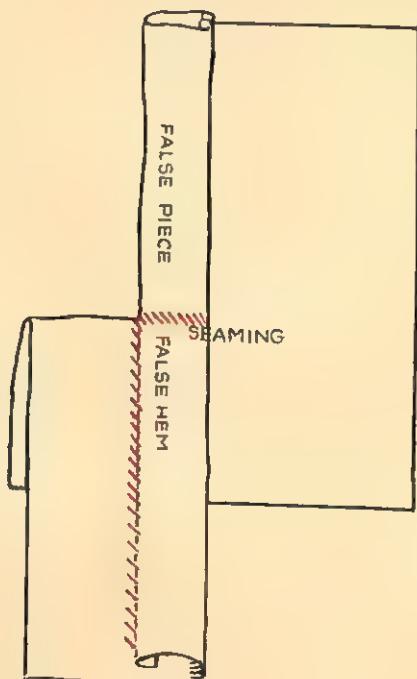
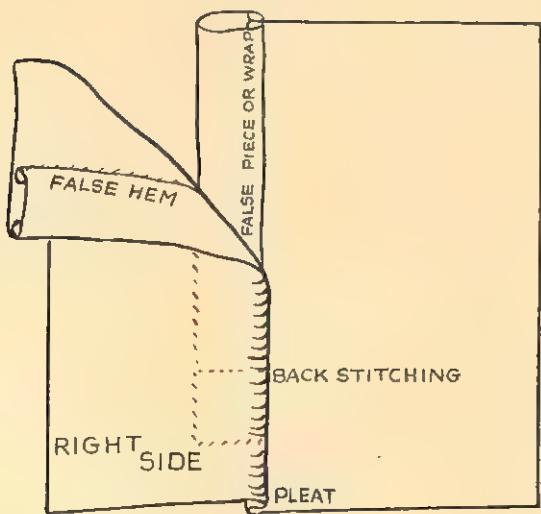
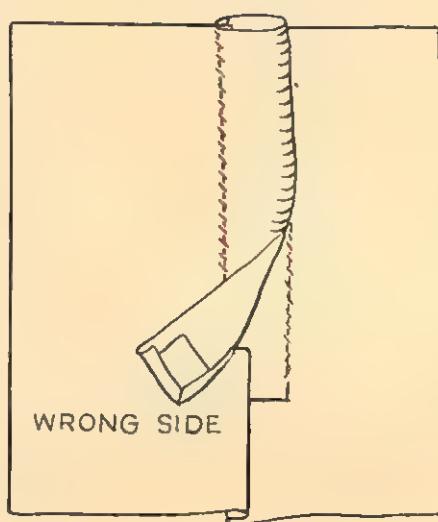
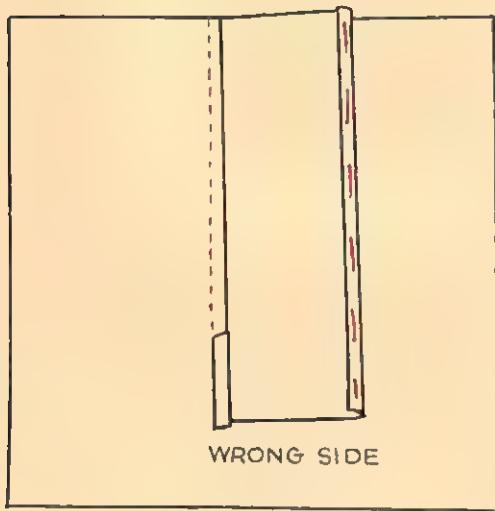
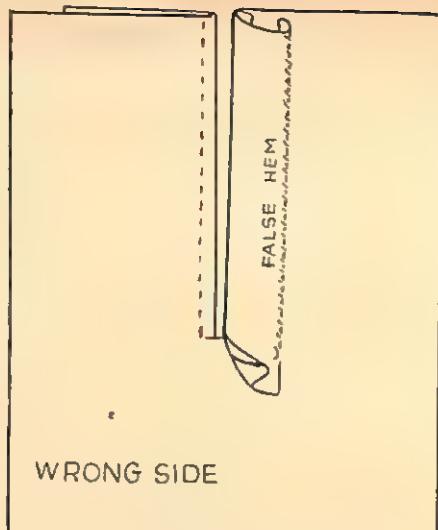
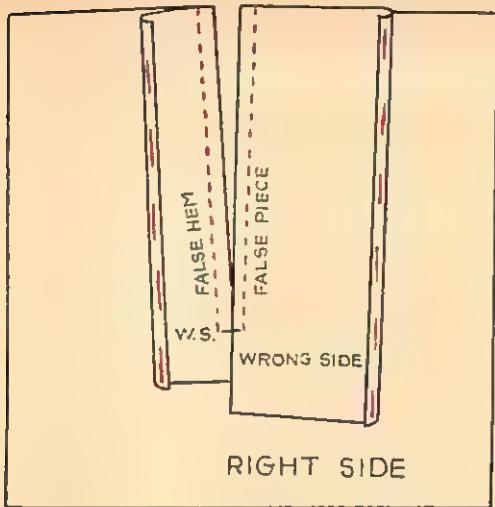


FIG. 13

FALSE HEM AND FALSE PIECE



Method of Working. Cut the facing to the desired shape. Place the right side of the facing to the wrong side of the garment. Pin the two raw edges together and tack into position. Run stitch or machine $\frac{1}{8}$ in. away from the raw edges. Snip the curved or shaped edges almost to the stitching. Turn the facing over on to the right side of the garment. Fix the facing to the required shape and tack into position. Machine or work a fancy stitch round the edges to keep the facing in position.

BINDING

As the name suggests, the raw edges to be bound are enclosed in the added binding.

Method of Working. Cut a strip of material, on the cross, twice the width of the finished binding plus two turnings.

Place the right side of the strip to the right side of the garment and pin into position. Tack to keep the two edges together. Run stitch or machine $\frac{1}{8}$ in. from the raw edges.

Make a fold $\frac{1}{8}$ in. wide on to the wrong side of the binding, and tack through this fold to keep it in position.

Turn the binding over to the wrong side of the garment, fix the fold edge of the binding to the stitching line and tack into position. Hem neatly, taking care not to let the stitches show through on to the right side of the garment. When finished the binding has a similar appearance on both sides of the garment.

Binding a Corner

Fix the cross-way strip as far as the corner and make a small pleat as shown in Fig. 15. Continue fixing the binding, and machine or run-stitch. Turn the binding on to the wrong side and fix a small pleat at the corner to correspond to the pleat on the right side.

Crossway Binding Round Curved Edge

Concave Curve (e.g. neck edge of a garment). The fold edge of the binding, when finished, is actually smaller than the setting-on edge; therefore, to make the binding fit, it must be slightly strained, or stretched, when being applied.

Convex Curve (e.g. Peter Pan Collar). The fold of the binding, when finished, is actually

larger than the setting-on edge; therefore, to make the binding fit, it must be slightly eased when being applied.

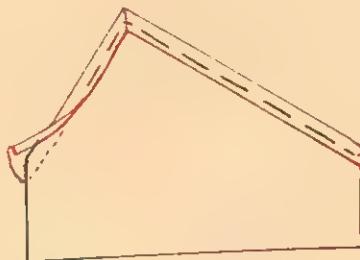
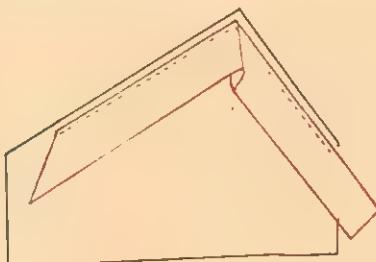


FIG. 15

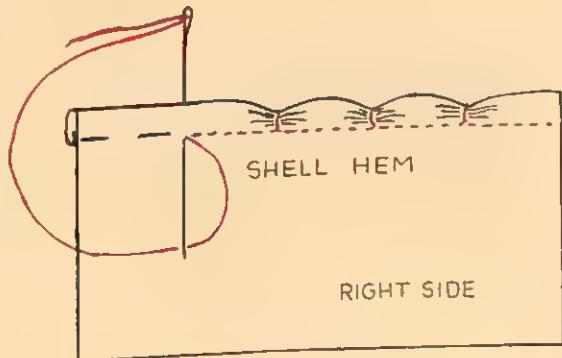


FIG. 16

A Shell Hem

A shell hem is a decorative method of finishing an edge.

Method of Working. The stitching is worked from right to left.

Fix and tack a simple hem. Make six running stitches along the edge of the hem and make a back stitch. Work a loop-stitch over the edge of the hem pulling the cotton tight (see diagram). Work a back stitch and then six more running stitches. Continue along the length of the edge.

Tucks

A tuck is a fold of material which is secured by a line of stitching. Tucks may serve either a useful or decorative purpose in the construction of a garment.

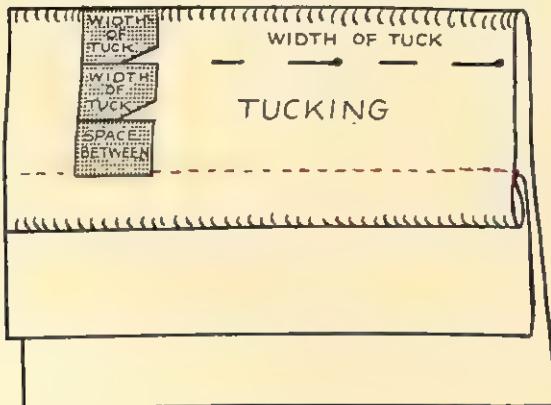


FIG. 17

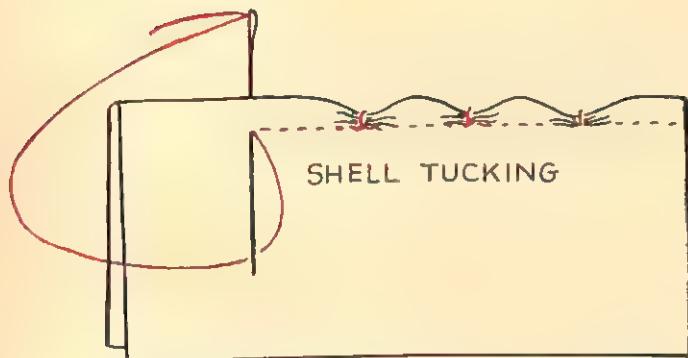


FIG. 19

Method of Working. The quantity of material taken up in a tuck is equal to twice the depth of the tuck.

To mark the position for tucks cut a piece of cardboard twice the depth of the tuck plus the space between, and mark each part carefully on the cardboard (see Fig. 17).

Place the edge of the cardboard, representing the edge of the space between the tucks, along the line of the stitching of the last tuck or hem of the garment. Fold the material parallel to the top edge of the cardboard. Mark the depth of the tuck from the fold and pin in the tuck.

Fix the tuck in this way to the length required. Pin Tucks may be arranged to follow a given

design. These provide an inexpensive but attractive method of decoration. In this case the shape of the design must be marked with a line of tacking stitches.

Shell Tucks

These are a variation of simple tucking, and provide a means of decoration.

Method of Working. The stitching is worked from right to left.

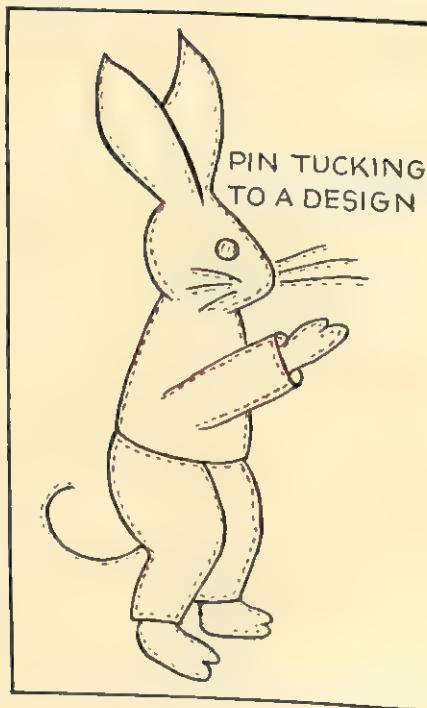


FIG. 18

Fix and tack a simple tuck. Make five or six running stitches along the width of the tuck and make a back stitch. Work a loop stitch over the edge of the tuck, pulling the cotton tight (see Fig. 19).

Work a back stitch and then five or six more running stitches. Continue in this way along the length of the tuck.

Pleats

Pleats are used to provide extra width in a garment and may also form part of the decorative scheme.

A pleat is a fold of material which is left free from stitching.

A Box Pleat

A Box pleat is formed by two pleats of equal size arranged with one pleat to the right and one pleat to the left. On the wrong side a box pleat forms an inverted pleat.

An Inverted Pleat

An Inverted pleat is formed by two pleats of equal size arranged so that the edges of the pleats meet.

Kilting

Kilting is an arrangement of small folds or pleats close together and very even. This form of pleating is done by machine.

To Mark for Pleats

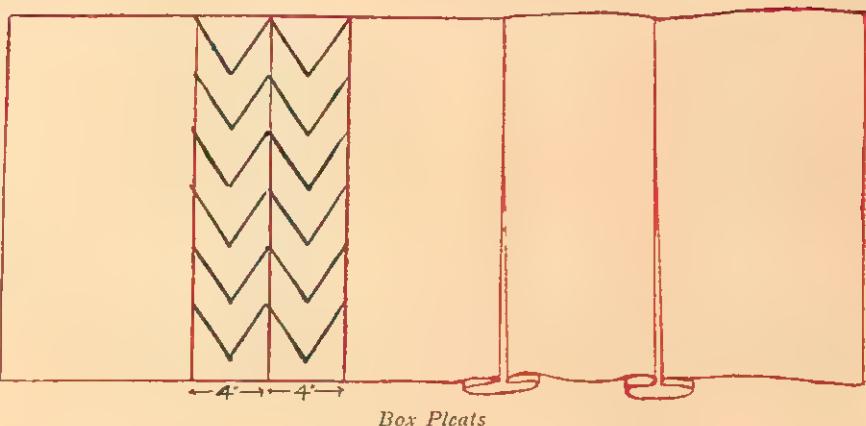
Decide on the size of the pleat, which will depend on the kind of material used and the position of the pleats in the garment, e.g.—

For a 2 in. pleat allow 4 in. of extra material for each pleat.

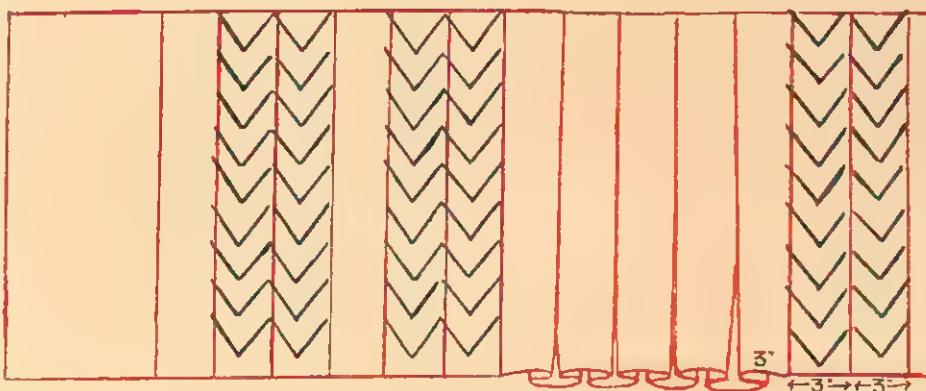
For a 1½ in. pleat allow 3 in. of extra material for each pleat.

For a 3 in. box pleat allow 3 in. of extra material for each half of the box-pleat.

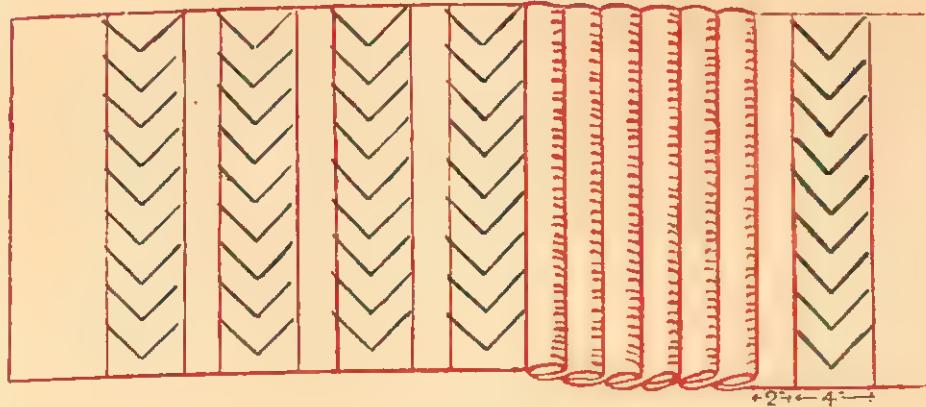
For an inverted pleat allow 4 in. of extra material for each half of the inverted pleat.



Box Pleats



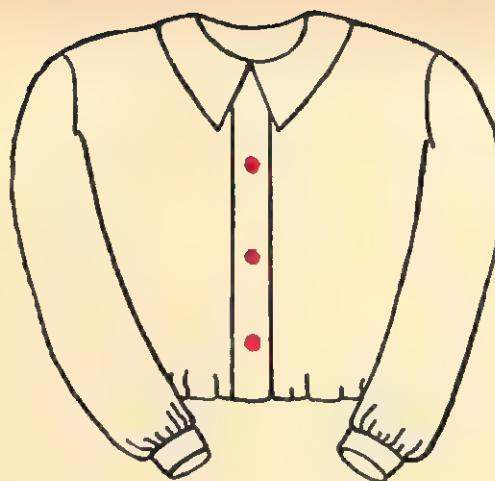
Inverted Pleats



Kilting

FIG. 20
Three Types of Pleats

BLOUSE



SHOWING
ADDED
BOXPLEAT
& WRAP

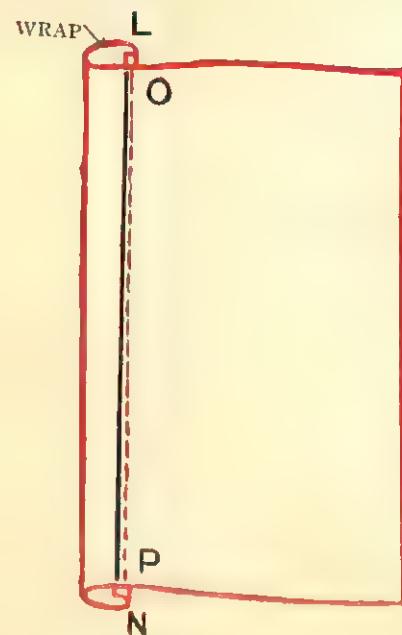
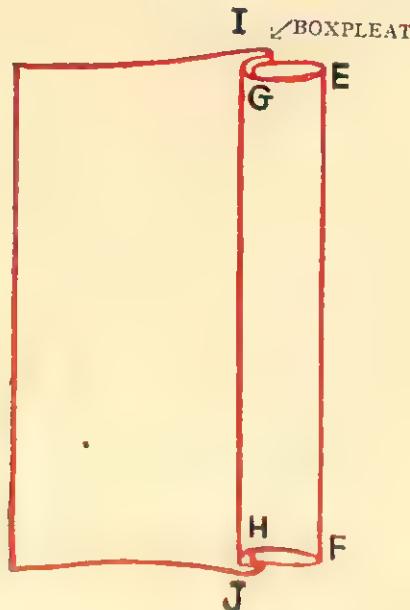
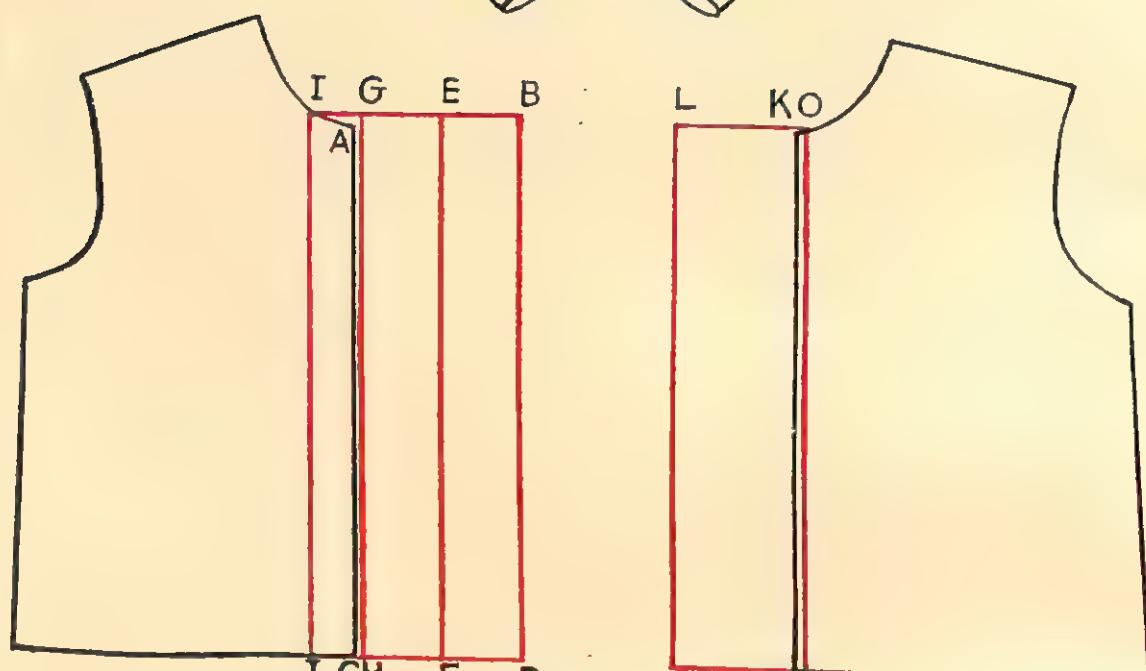


FIG. 21

Pressing

Careful pressing is an important process in the making of any garment.

Always have the iron clean and test the heat of it on a piece of material.

Before pressing, take out all the tacking stitches except those which are holding pleats in position.

Embroidery and lace should be pressed on the wrong side over a thick pad.

When pressing velvet hold the velvet away from any flat surface and pass the iron over the wrong side of the material.

When pressing silk, or other fine material, place a piece of tissue paper over it.

When pressing dress materials and serge, press on the wrong side of the garment.

Damp Pressing. E.g. as for pleats in a Gym. Tunic. Use a piece of clean cotton material of loose texture and free from dressing. Wring the cloth out in cold water. Place the damp cloth over the part of the garment which is to be pressed. Use a hot iron and press firmly. Lift up the edge of each pleat and press on the single material to remove any impressions made by the fold edge of the pleat.

Added Box Pleat and Wrap

The box pleat is added on to the right-hand edge of the front bodice block (Fig. 21) and is suitable for using on gym. blouses.

Right-hand Front of Blouse.

Allow $3\frac{1}{4}$ in. extra outside the centre front line. This allows for a $1\frac{1}{2}$ in. box pleat.

$$A-B = 3\frac{1}{4} \text{ in.}$$

$$C-D = 3\frac{1}{4} \text{ in.}$$

$$B-E = 1\frac{1}{2} \text{ in.}$$

$$D-F = 1\frac{1}{2} \text{ in.}$$

Fold along *EF* for the left-hand edge of the box pleat and tack in position.

$$E-G = 1\frac{1}{2} \text{ in.}$$

$$F-H = 1\frac{1}{2} \text{ in.}$$

Fold along *GH* for the right-hand edge of the box pleat, enclosing the raw edge *BD*. Tack in position.

$$A-I \text{ is } \frac{3}{4} \text{ in. away from the centre front line.}$$

$$C-J \text{ is } \frac{3}{4} \text{ in. away from the centre front line.}$$

Bring the fold line *GH* to the line *IJ* and tack through to hold the box pleat in position. Machine at each edge of the box pleat $\frac{1}{4}$ in. away from the edge.

Left-hand Front.

$$K-L \text{ is } 2\frac{1}{4} \text{ in. away from the centre front edge.}$$

$$M-N = 2\frac{1}{4} \text{ in.}$$

$$K-O = \frac{1}{2} \text{ in. away from the centre front edge.}$$

$$M-P = \frac{1}{2} \text{ in.}$$

Turn and tack a narrow fold on to the wrong side from *L-N*. Bring this fold edge over to the line *O-P*. Tack in position and hem to finish.

REPAIRING GARMENTS

Patching

A patch is a piece of material which is applied to a garment to replace that part of it which is worn out.

For the patching use material as much like the original garment in colour and texture as it is possible to obtain; avoid new material if possible, but if it must be used wash it first.

The patch must cover all the weak material which surrounds a hole or tear. It must be set on with the selvedge way of the patch following the selvedge way of the garment.

METHOD OF WORKING PATCH FOR CALICO OR CAMBRIC GARMENT

Cut the piece of material for the patch to the right size. Lay the right side of the patch to face the wrong side of the garment, and pin into position. Fold a narrow turn on to the wrong side all round the edges of the patch. Tack the patch carefully into position. Hem round the edges of the patch. Turn to the right side of the garment. Mark a turning with pins $\frac{3}{8}$ in. wide away from the hemming. Cut the worn part of the garment away, leaving the turning $\frac{3}{8}$ in. wide, as indicated in Fig. 22.

Make a snip at each corner of the hole as in the diagram. Fold a $\frac{1}{8}$ in. turning on to the wrong side and tack into position through the patch. The worker should hold the patch towards herself and seam round the edges to finish.

WORKING A PATCH FOR PATTERNED MATERIAL

When patterned garments are being mended,

the most important point to consider is the matching of the design. If the pattern is carefully matched the repair will be almost invisible.

Place the piece of material for the patch with its wrong side to the right side of the garment. Match the pattern carefully over the worn-out part of the garment, and mark off the required size for the patch. Cut the patch to the required size and pin into position.

Fold a single turn $\frac{3}{8}$ in. wide on to the wrong side of the two selvedge sides of the patch. Fold a single turn $\frac{3}{8}$ in. wide on to the two weft sides of the patch. Tack the patch round the four sides to keep it in position. The four edges should now be seamed round, the worker holding the patch towards herself. Flatten out the seaming with the finger and thumb.

Turn to the wrong side and mark off with pins a turning $\frac{3}{8}$ in. away from the seaming, and cut away the worn part by these pins.

Loop stitch the two turnings together on the wrong side of the garment.

Patch Let into a Seam

Specimen patch let into the under-arm seam of a girl's princess petticoat.

Method of Working. Unpick the

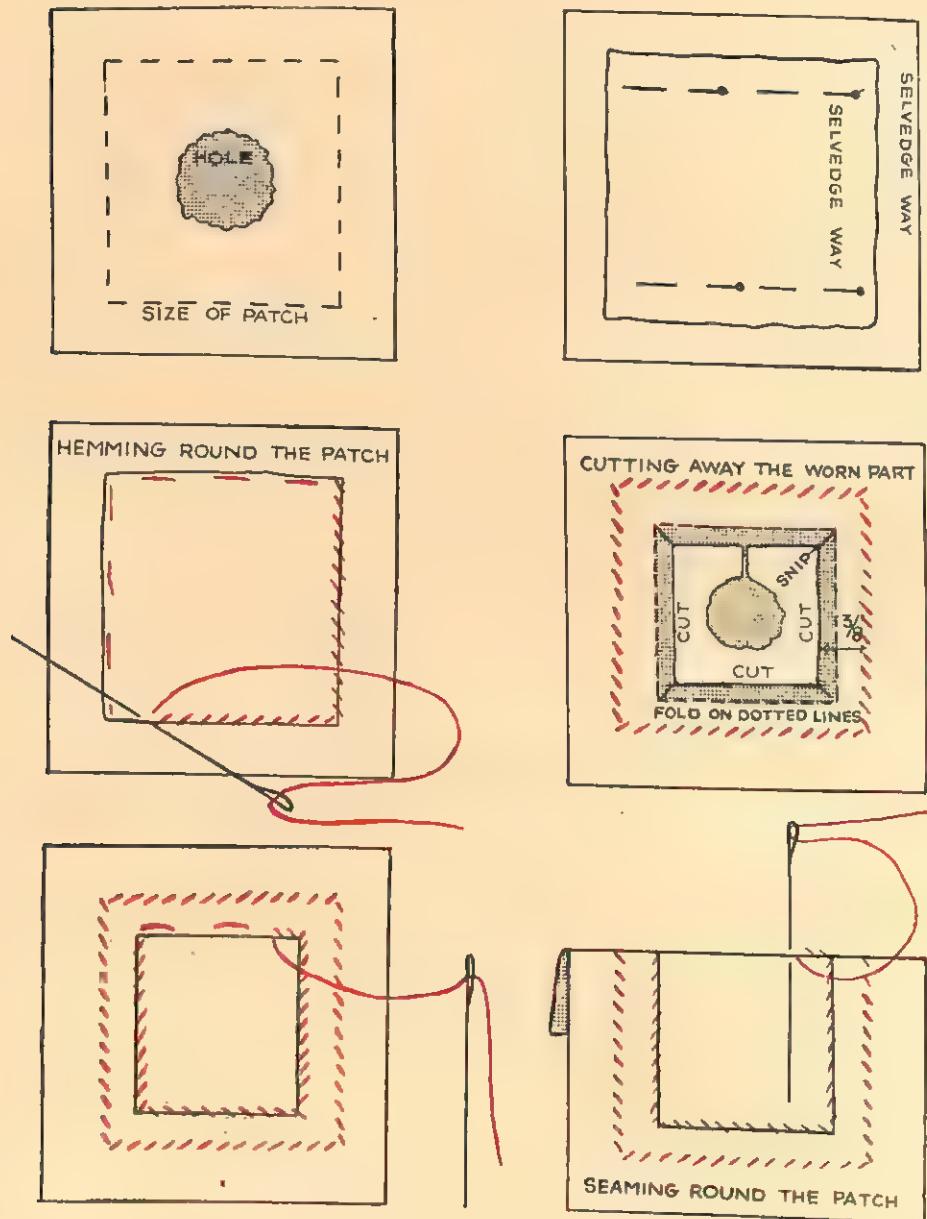


FIG. 22

under-arm seam of the garment to a distance of 3 in. below the worn part. Unpick the armhole portion for the distance required. Cut a piece of material to the required shape and size, plus turnings. Lay the right side of the piece to face the wrong side of the garment and pin into position.

Fold a single turn $\frac{1}{8}$ in. wide on to the right side of the piece.

Tack round the two sides. Hem round the two sides. Turn to the right side of the garment. Mark a turning with pins $\frac{3}{8}$ in. wide as indicated in Fig. 24.

Snip the turning at the corner, as shown in diagram.

Fold a turning $\frac{1}{8}$ in. wide on to the wrong side of the garment, and tack into position through the added piece.

Holding the patch towards herself, the worker now seams round the two edges.

Join the under-arm seam to match the seam of the garment. Finish the armhole section of the patch to correspond with the armhole of the garment.

tack into place on the garment. Machine or back stitch round the three edges.

Press on the wrong side of the garment to finish.

Darning

The old saying "A stitch in time saves nine" is still worth remembering. Darning a thin

PRINT PATCH

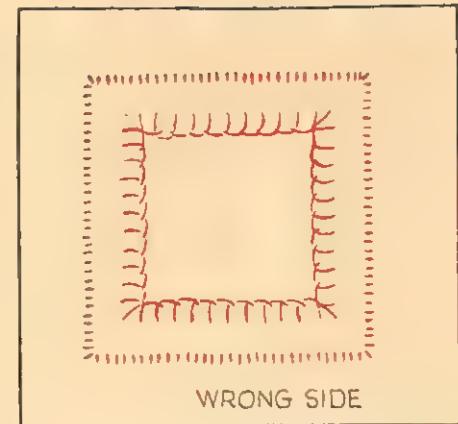
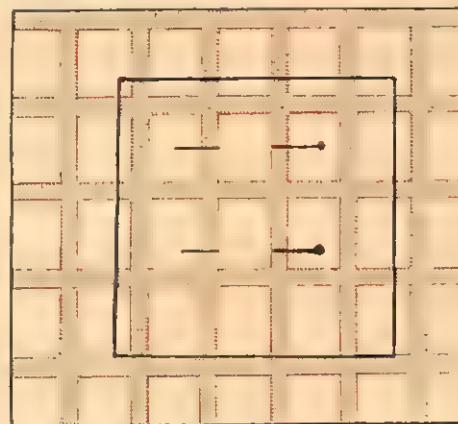


FIG. 23

Decorative Patching

Appliquéd Work

In this method the worn place or the hole is repaired by means of added pieces which are cut to the desired shapes and applied by means of a decorative stitch.

Method of Working. Cut the pieces large enough to cover up the hole and to correspond with the chosen design (see Fig. 25).

Pin the pieces on to the garment and tack into position. Run stitch round the edges of the added pieces. Work loop stitching round the edges to finish. Complete the design by lines of stitching where necessary; e.g. veins in leaves or stems.

Applied Pocket to Cover up a Darn or Patch

Cut the pocket the required size according to its position. Finish the top edge of the pocket to correspond with any other decorations on the garment, e.g. over-stitching in two colours.

Turn in the three sides of the pocket. Pin and

place in a garment or household article prevents the formation of a hole and so prolongs the life of the garment. This darning may be worked either by hand or by machine, but it is essential that the darning is worked to cover a greater area than the actual thin place. When darning fine material by hand, take up two threads and pass over the same number, but when darning



coarse material take up one thread and pass over one thread.

Machine darning is specially useful for repairing table and household linen. The necessary apparatus for this simple process can be bought from the Singer Sewing Machine Company as follows—

	s. d.
1 spring foot	1 6
1 embroidery frame	1 3
1 feed cover plate	8
1 reel silk (10 gram)	$3\frac{1}{2}$
Total cost	$3\frac{8}{12}$

(A better quality of spring foot may be obtained, price 4s. 6d.)

Hedge-Tear Darn

This usually occurs in dress material, and is often caused by catching on a nail or sharp point. The tear is in the form of a right angle, and is parallel to the weft and the warp of the material. The thread for mending should be of the same texture as the material, and often a selvedge thread of the material is used to make a successful darn.

Method of Working. Work the darn on the wrong side of the material if possible. Draw the cut edges together with a lacing stitch. Begin the darning the weft way of the material, and hold the work so that the warp threads lie along the finger.

Beginning at the left hand side $\frac{3}{8}$ in. to the left of Point B (Fig. 27) and $\frac{3}{8}$ in. above Point B, darn to $\frac{3}{8}$ in. below Point B, taking up one-tenth of an inch, and passing over the same amount of material, keeping in

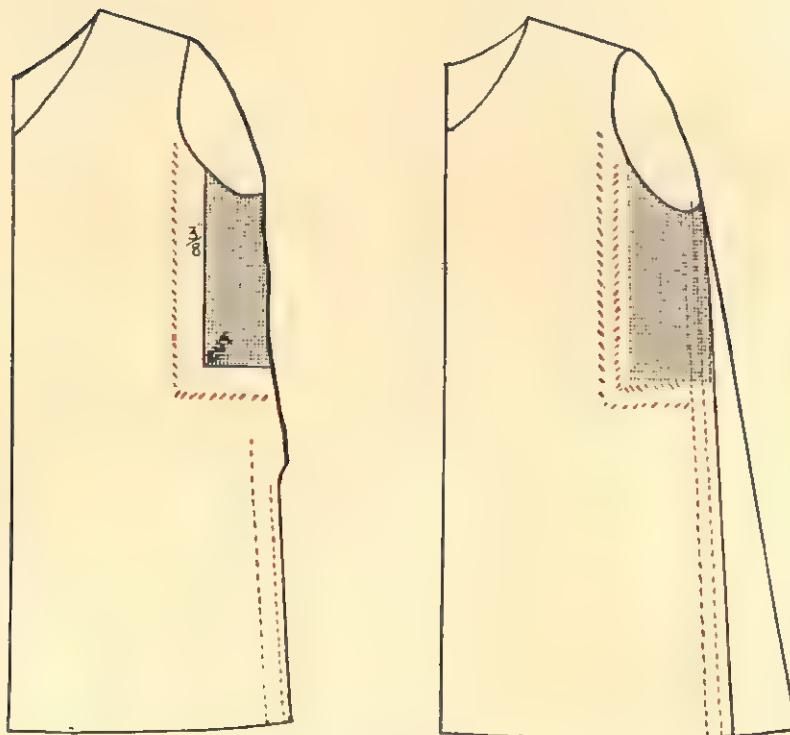


FIG. 24
Patch let into a Seam

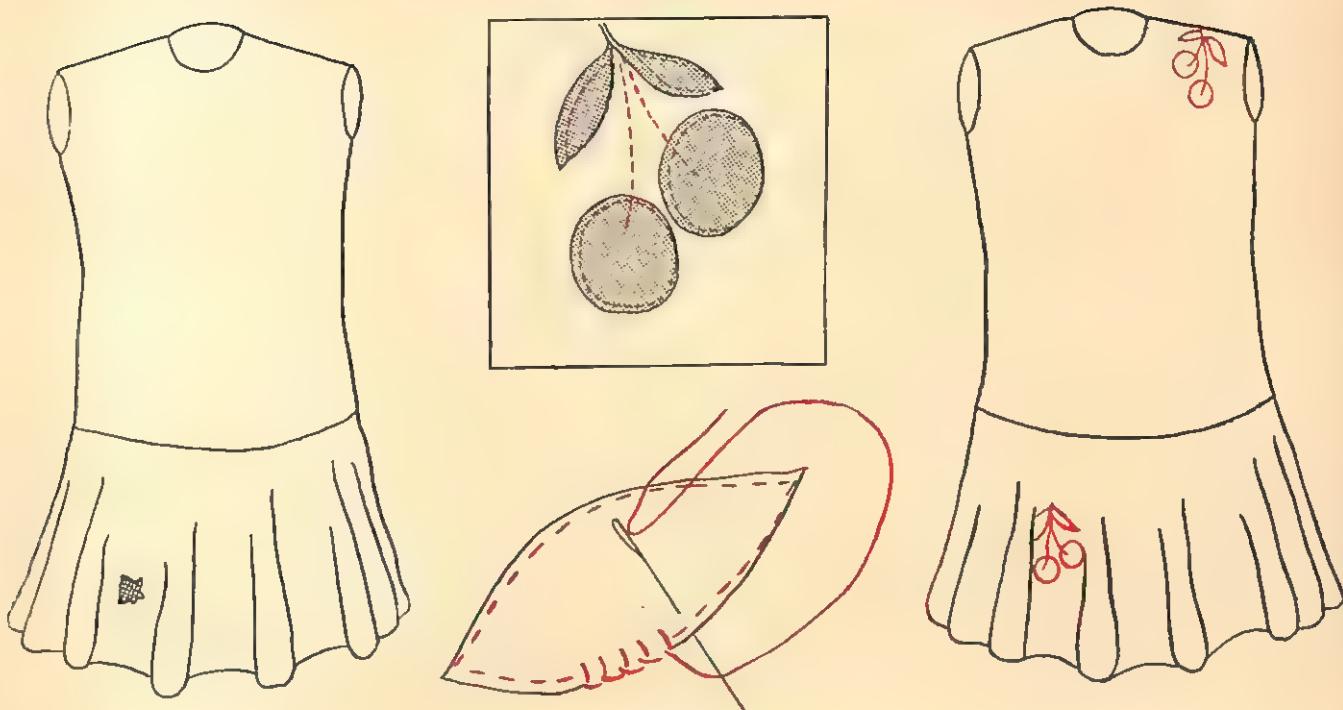


FIG. 25
Decorative Patching: Appliquéd Work

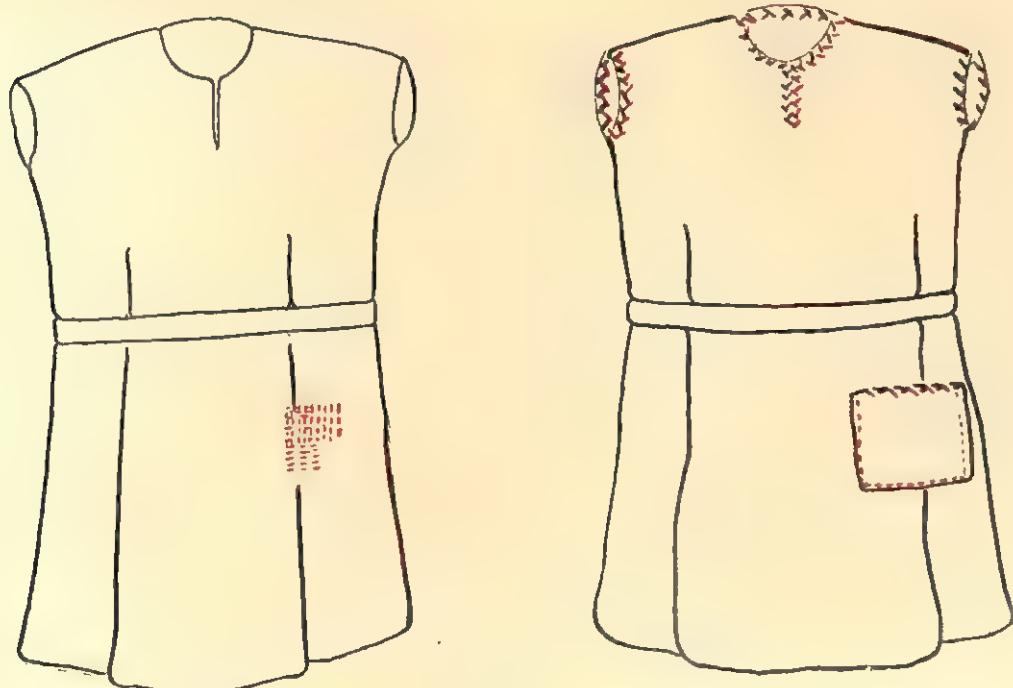


FIG. 26
Applied Pocket to Cover Patch or Darn

a line with the weft threads. Leave a small loop at the end of each row, and continue the darning three-quarters of the way across, taking care to hold the cut edges between the finger and thumb while the thread is drawn through.

Unthread the needle and work three-quarters of the warp darning as follows: thread the

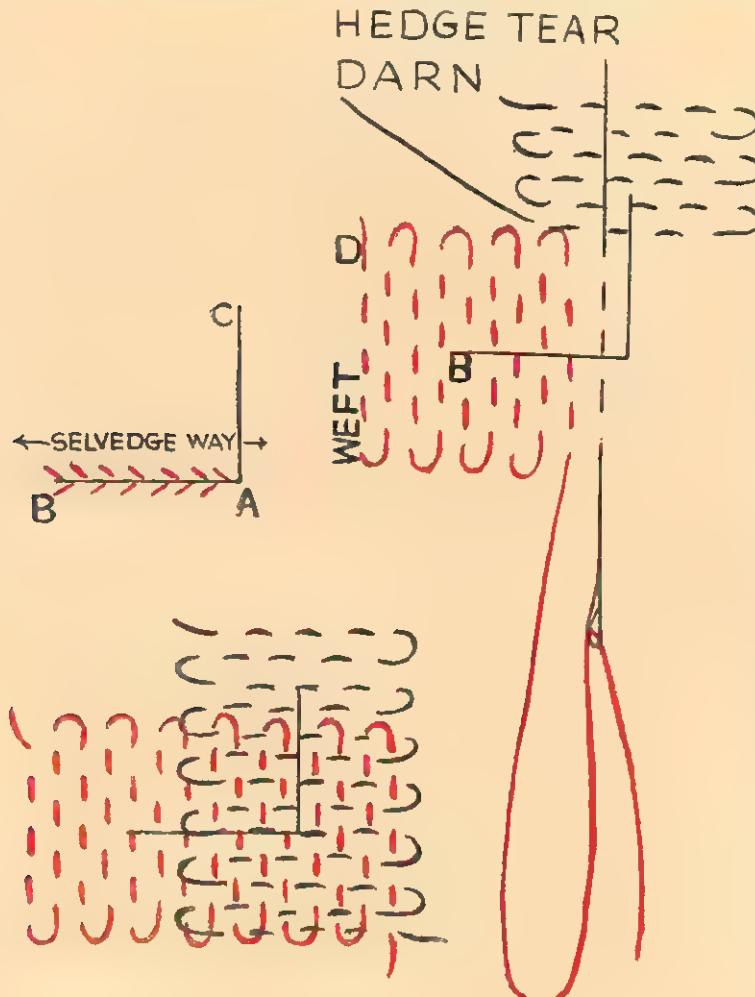


FIG. 27

needle and insert it $\frac{1}{8}$ in. to the left of Point C and $\frac{1}{8}$ in. above Point C, turn the work round and continue the warp darning three-quarters of the way across the tear.

Unthread the needle, and rethread it with the weft darning thread.

Continue the weft darning to meet the loops of the warp darning.

Cut off the thread and finish the warp darning.

Cross-Cut Darn

This method of working is adopted when the place to be mended is a cut which occurs diagonally across the warp and weft threads. The need for this darn often arises when dealing with table or household linen.

Method of Working. Begin by stitching the cross-cut edges together, using a lacing stitch. When working the darn take care to keep the raw edges of the cut to the wrong side, and avoid fraying by keeping the thumb on the cut while drawing the thread through.

Crease 1. Make a crease the weft way of the material $\frac{1}{4}$ in. above the end of the cut (see Fig. 28).

Crease 2. Make a second crease at right angles to the first crease $\frac{1}{4}$ in. from the other end of the cut.

It will depend which way the cut slopes—right to left or left to right—as to which way this crease is made, whether at the right-hand side or the left-hand side, but it must always be folded so that the angle formed by the joining of the creases (see A in Fig. 28) is the apex of a triangle of which the cut is the base. It should be clearly noticed that Point A is opposite to the cut and not in a line with it.

Always darn on the wrong side.

Begin at Point A, the apex of the triangle.

Take up two threads on the needle (or $\frac{1}{8}$ in. on damask) and pass over the same amount until Point B is reached.

Count the number of stitches on the needle and take the same number below Point B.

Begin $\frac{1}{8}$ in. away and $\frac{1}{8}$ in. up from the last stitch, slanting in the direction of the cut.

The darning is raised one stitch in each row, so that the loops are parallel with the cut. There should be the same number of stitches on each row, and short loops $\frac{1}{8}$ in. should be left at the end of each row to keep the work flat.

Darn across the cut, and continue the darning to Crease 3, which must now be made, and is

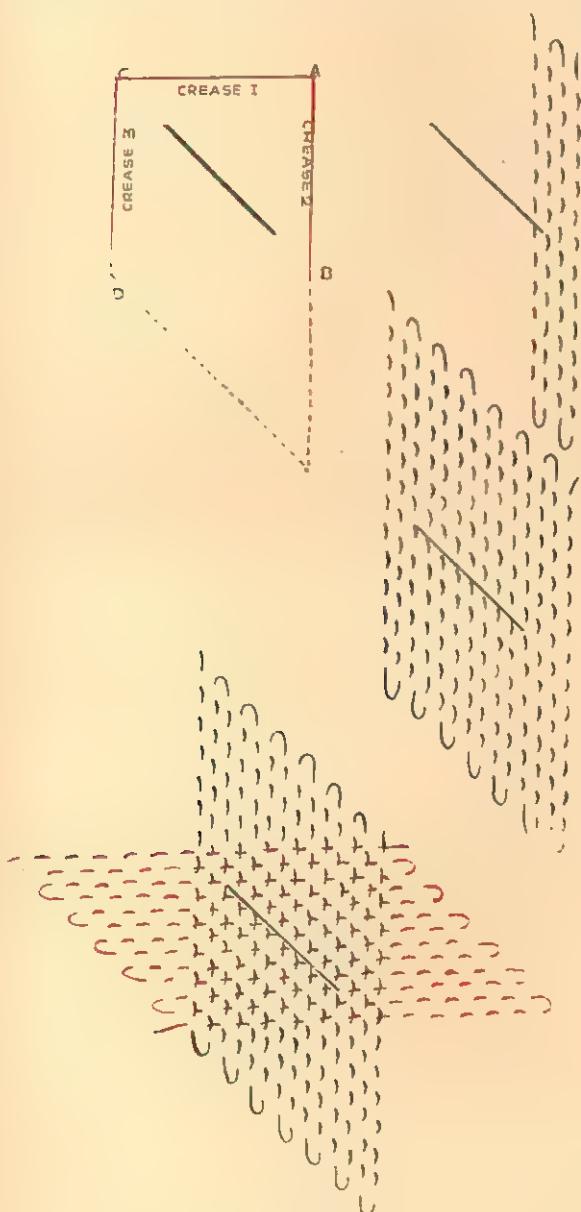


FIG. 28
Cross-Cut Darn

represented by *CD* in the square *ABDC* (see Fig. 28).

Turn the work round and darn the weft way of the material. Commence at Point *A*, exactly the same place as for the warp darning. Take up the same number of threads, or amount of material, on the needle, and leave the same space. Be careful that the needle takes up the material as well as the darning thread, so that the stitches in crossing show through clearly on the right side.

When crossing over the cut, the strand which is taken up in one row is passed over in the next row, so as to form a lattice work, as in mending a hole in a stocking.

When the weft darning is completed, the darn should be the shape shown in the diagram, consisting of two triangles, the apex of the one fitting into the base of the other. The cut when finished, will be enclosed in a square

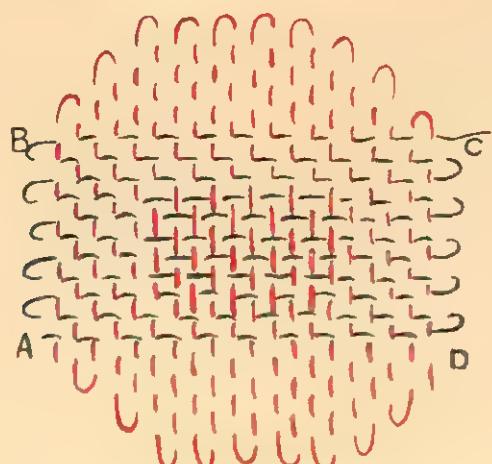
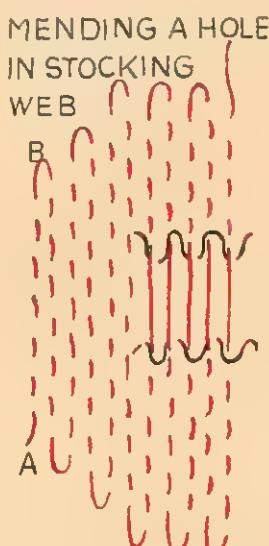


FIG. 29

REPAIRING A BUTTONHOLE AND PLACE FOR BUTTON

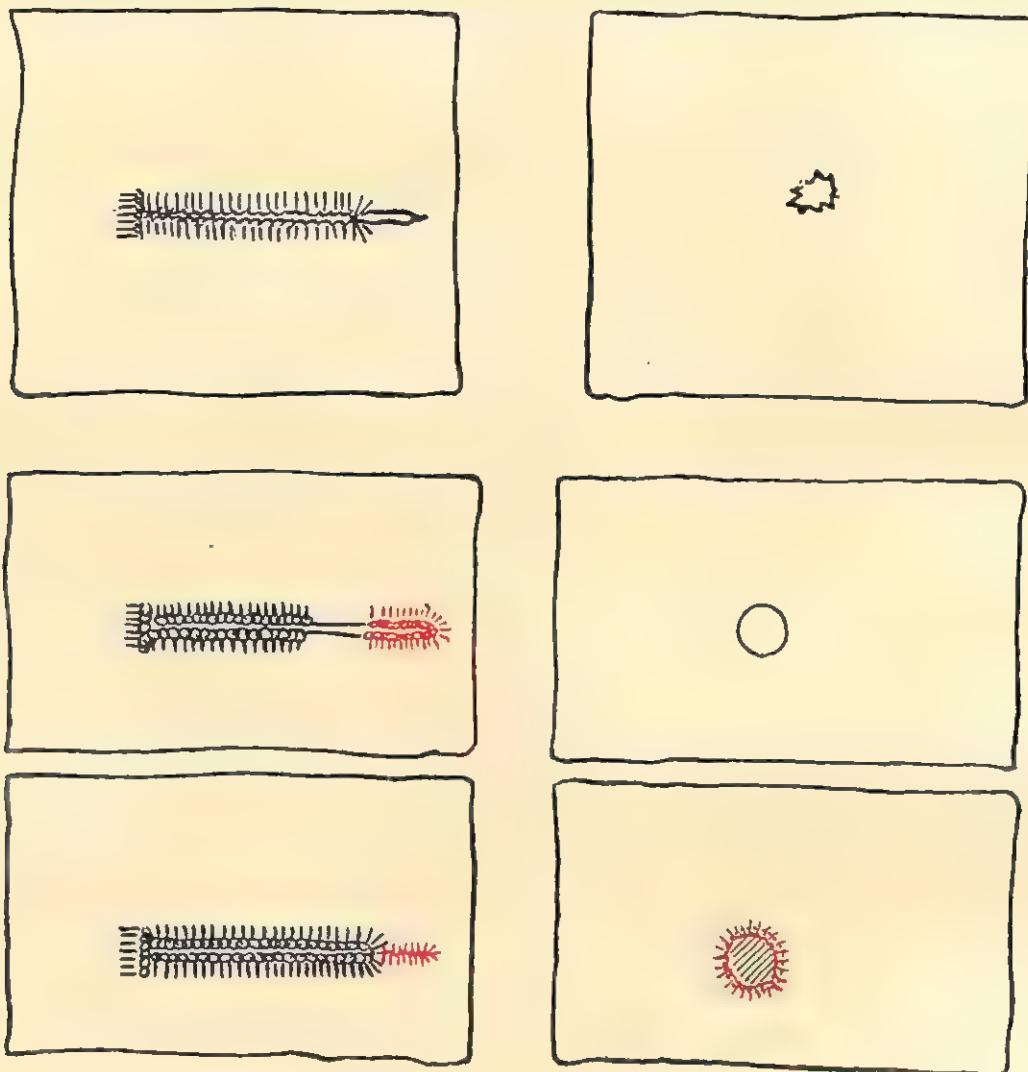


FIG. 30

of darning, where the weft and the warp darning threads cross each other.

Mending a Hole in Stocking Web

In addition to mending stockings, this method applies to all garments of similar weave, e.g. jersey, scarf, or knitted cap. In this method the darn forms a lattice work over the hole.

Method of Working. Take away with the needle all fluff from the hole so that all the loops

are clear. Turn the stocking or garment to the wrong side, and darn the ends of the broken loops through to this side.

Begin darning with the up loops about $\frac{1}{2}$ in. below and $\frac{1}{2}$ in. to the left of the hole. Take up and pass over the same number of threads (one or two threads according to the thickness of the webbing), darning for the same distance above the hole as below. Continue darning as for a thin place until the hole is reached.

Leave loops $\frac{1}{8}$ in. at the edge of the darn and

increase or decrease the number of stitches on a row to make the shape of the darn required. It should be noticed that the loops at the lower edge of the hole are not opposite to the loops at the upper edge. In crossing the hole, if the needle is passed through a loop in the upper row it must be passed into the corresponding space in the lower row. (See Fig. 29.) Leave the threads sufficiently loose to keep the work flat. Increase each row in length until about one-third of the width of the darn is reached. Then work over the centre without increasing, and decrease on the right-hand side to correspond with the left-hand side. This completes the warp darning and forms strands on which to work the lattice.

To work the lattice over the warp threads, turn the work round so that the beginning of the darn (Fig. 29, Point *A*) is at the top left-hand corner, and Point *B* is at the top right-hand corner. Begin crossing the darn at the lower right-hand corner, which corresponds with Point *C*, taking up the same number of threads as before. Work to the Point *B*, leave a loop $\frac{1}{8}$ in. long, turn the work round and continue with the second row, taking up the threads which were passed over in the preceding row. Continue this until the hole is reached. Make an even lattice over the hole by taking up alternate threads. When the hole is covered continue the darning to Point *A* as in Fig. 29.

Repairing a Button-Hole and Place for a Button

The Button-Hole. Unpick the round end of the button-hole.

Button-hole stitch round the torn slit, then seam the stitches together for the length of the slit.

Rework the round end of the button-hole.

The Place for a Button. Cut the jagged edges of the material straight.

Lay a new piece of material under the hole.

Loop stitch round the hole, catching the new material with each stitch.

Stitch the button on in its correct position.

Mending Ladders in Silk Stockings

Turn to the wrong side of the stocking. Fold down the centre of the ladder. Tack a small tuck

enclosing the ladder, and run stitch or machine, tapering off to a fine point at each end of the ladder.

Press the seam.

When the seam is finished it is almost invisible.

Repairing Suede Gloves

Use silk to match the gloves.

Work loop stitch all round the hole or slit. Seam the edges of loop stitching together.

Repairing Woollen Gloves

Darn with wool to match the gloves, following the instructions given under the heading "Darning" (page 133 *et seq.*).

Methods of Lengthening Garments

With a False Hem

Method of Working. Unpick the hem and iron out the creases. Cut strips of material $2\frac{1}{2}$ in. wide and long enough to fit round the hem of the garment. Join the strips together. Fix the false hem with the right side of the false piece to the right side of the garment and tack into position. Run stitch the two edges together $\frac{1}{8}$ in. away from the edge. Turn the false hem on to the wrong side of the garment and tack close to the seam to hold the hem in position. Turn and tack a single fold on to the wrong side of the false piece. Tack the hem in position and run stitch or hem to finish.

With an Added Piece

Lengthening a party frock with an added piece of net, or other material, is a useful economy for growing children. (A similar method enables a frock to be made wider also, see Fig. 32.)

Lengthening with Net. The hem of the party frock is finished with picot edging.

Method of Working. Cut the strips of net twice the required width plus 1 in. Join the strips together to make a circular piece equal to the width of the garment at the hem. Tack the two raw edges of the net together.

Fix the lower edge of the garment on to the

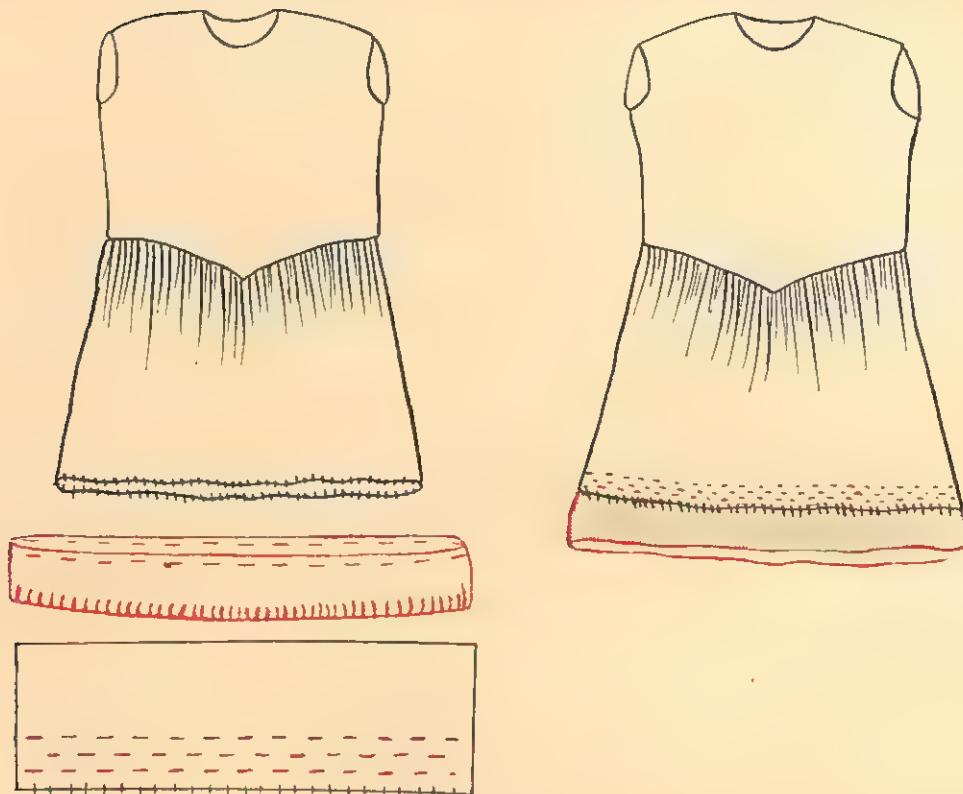


FIG. 31
Lengthening with an Added Piece

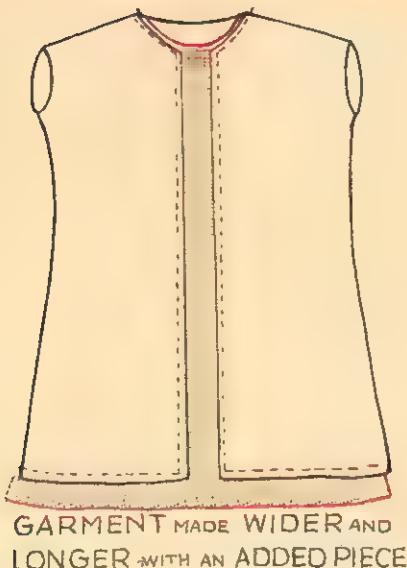


FIG. 32

net, over-wrapping for $\frac{1}{2}$ in. Tack into position and run stitch with embroidery silk close to the picot edging. Work two more rows of running to keep the turnings of net in position (see diagram).

Lengthening a Garment with Crochet Work

Knickers may be lengthened at both waist and knee by the addition of double crochet worked into the edge of the garment.

A second row of treble crochet is worked into the loops of the first row, leaving a chain between each treble crochet.

Work as many rows of treble crochet as are required to give the necessary length at either place. Thread the elastic through the holes and draw up to the size required.

The same method of lengthening may be used on other garments, such as vests, combinations, petticoats, jumpers and skirts, and frocks.

To draw up the neck of a frock, work a length of chain (Fig. 33), thread through the holes and tie.

Double Crochet (Fig. 33, Diagrams II and III).

Commence with a loop on the needle.

*Insert the needle through the edge of the garment at A.

Pick up the wool at B.

Pull the needle through, keeping the new loop on the needle.

Wool over the needle and pull through both loops.

Repeat from * round the garment, joining the last stitch to the first one made.

Chain 3, then work treble crochet.

Treble Crochet (Fig. 33, Diagram IV).

*Wrap wool over the needle.

Insert at A between two stitches of previous row.

Take up a second loop on the needle and pull through.

Wool over the needle, work off two loops.

Wool over the needle, work off remaining loops.

Chain 1, repeat from * round the garment.

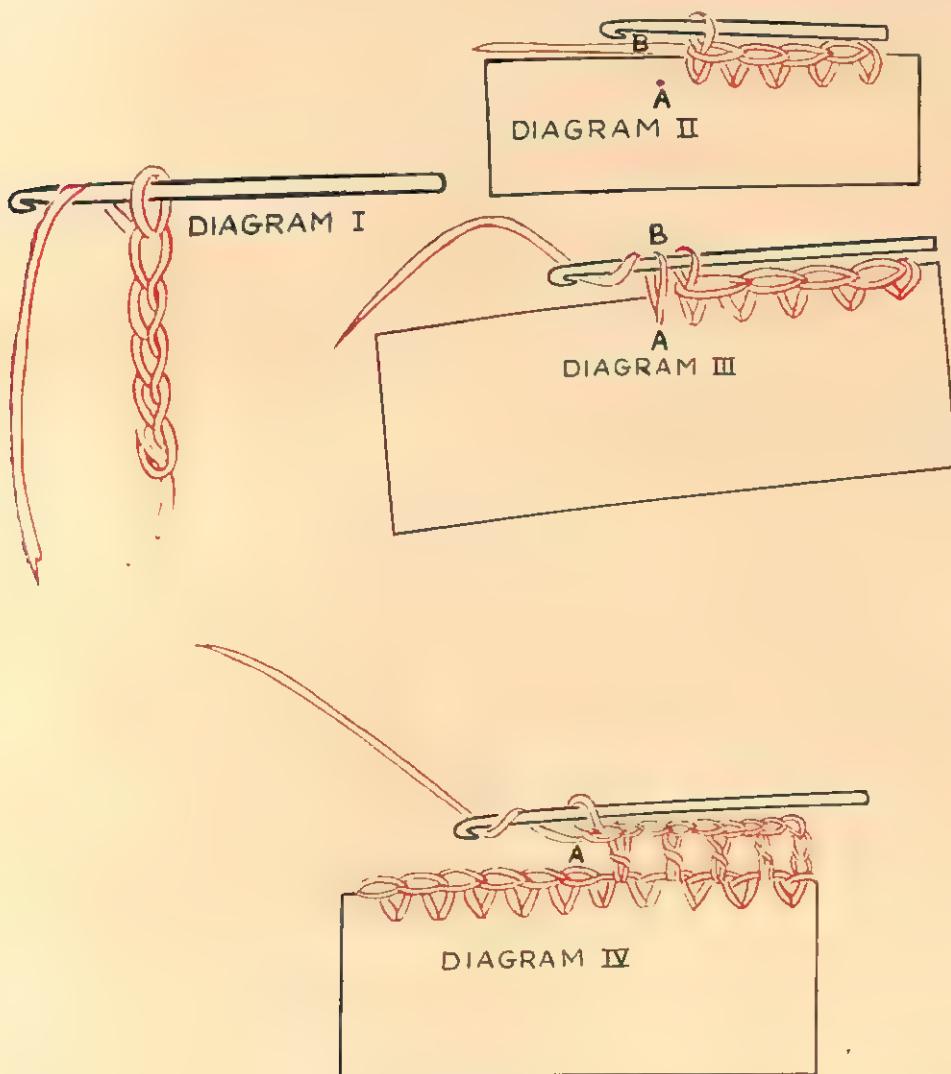


FIG. 33

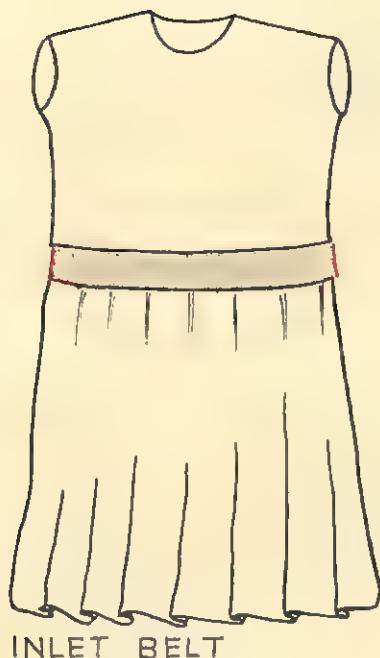


FIG. 34

Inlet Belt

Method of Working. The material used for this purpose is the original belt of the garment.

Unpick the belt and iron out the creases.

Mark with tacking the centre front, centre back, and the sides of the bodice and the skirt; then unpick the waist seam.

Measure round the waist edge of the bodice and join up the piece to be inlet into a circular band to correspond in size.

Place the right side of the band to the right side of the bodice; tack into position.

Machine or back stitch the two edges together $\frac{1}{4}$ in. from the edge.

Mark the centre back, front, and sides of the band.

Place the right side of the skirt to the right side of the band with the centre front, centre back, and sides of the skirt to the corresponding points on the band.

Tack into position.

Machine or back stitch $\frac{1}{4}$ in. from the edge.

Over stitch all the raw edges to neaten.

THINGS TO MAKE

Handkerchief Case

This is made from an oblong of material 18 in. by 6 in.

Fold the oblong into three equal divisions (see diagram).

Mark the division lines with tacking.

Turn and tack a single fold $\frac{1}{4}$ in. wide all round the oblong *ABDC*.

Loop stitch round the oblong over this folded edge. The stitches must be just deep enough to enclose the raw edges, and $\frac{1}{8}$ in. apart.

Fold *C* to *E* and *D* to *F*.

Seam the edges of the loop stitching together from *C* to *G* and from *D* to *H* with embroidery cotton, of a contrasting colour.

Sewing Tidy

This is made from an oblong of material 15 in. by 7 in. (see Fig. 36).

Fold the oblong into three equal divisions.

Mark the division lines with tacking.

Cut a piece of flannel 5 in. by 7 in. and loop stitch across one of the long sides.

Place the corners of flannel *AB* to the corners of material *AB*.

Pin to keep in position and then tack.

Bind round the oblong with a crossway strip of material, which may be of a contrasting colour. This will enclose all the raw edges.

Fold *C* to *E* and *D* to *F*.

Seam the edges of the binding together as described for loop stitching of Handkerchief Case.

Nightdress Case

This is made from four oval pieces of material.

The two ovals used for the lining may be of contrasting colour.

Place two ovals of material with right sides together. Tack the edges to keep in position.

Run stitch $\frac{1}{4}$ in. from the edge leaving 3 in. unstitched (see Fig. 37).

Take out the tackings and turn the work through to the right side. Press the seam with the finger and thumb, keeping the two edges exactly together. Tack firmly $\frac{1}{2}$ in. from the edge. This would make the front portion of the nightdress case. Make the back portion using the same method.

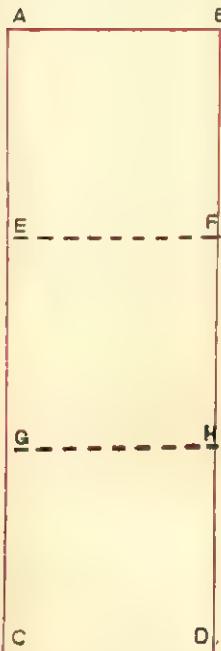


FIG. 35
Handkerchief Case

To join the back and front together see Fig. 37.

A to *D* equals half *A* to *B*.

A to *C* equals half *A* to *B*.

D to *C* equals the opening of nightdress case.

Pin the two sections together and tack to keep in position.

Seam the edges together from *C* through *B* to *D*.

The edges may be finished with loop stitching or overcasting worked in two colours.

Sponge Bag

This is made from a child's well-worn oiled silk coat. Cut two pieces of the oiled silk, each to measure 11 in. by 7 in. Pin the two pieces of material together; tack round the three sides.

In Fig. 38, *A* to *B* = 4 in. and *C* to *D* = 4 in.

Run stitch round the bag from *B* to *D* $\frac{1}{4}$ in. from the edge. Press the turnings open. This will make fold edges from *A* to *B* and *C* to *D*. Run stitch $\frac{1}{8}$ in. in from the edge of the fold.

Turn and tack a single fold $\frac{1}{8}$ in. wide across the top of each part of the bag. Fix hems $1\frac{1}{2}$ in. wide round the top of the bag; run stitch close to the edge of the hems. Work a second row of

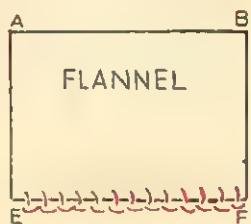
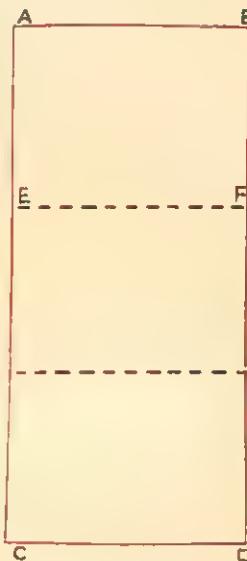
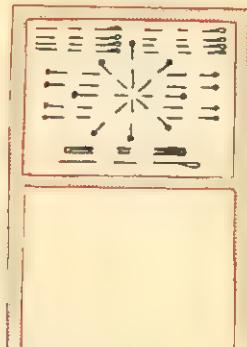


FIG. 36
Sewing Tidy

run stitching $\frac{1}{2}$ in. above the first row. This will form a slot through which the two lengths of cord are inserted to make a draw-up bag.

Cut the two lengths of cord 18 in. long. Thread one length of cord through the slot, over-lap the two ends for $\frac{1}{2}$ in., wrap the cotton tightly round the two thicknesses of cord and make secure by seaming over.

Thread the second cord through and join in the same manner.



Beach Bag

This is made from an old raincoat. To make the pattern—

$$A-B = 15 \text{ in.}$$

$$A-C = 15 \text{ in.}$$

$$A-E = \text{one-half } A-B.$$

$$C-F = \text{one-half } C-D.$$

$$C-G = \text{one-half } C-A.$$

$$D-H = \text{one-half } D-B.$$

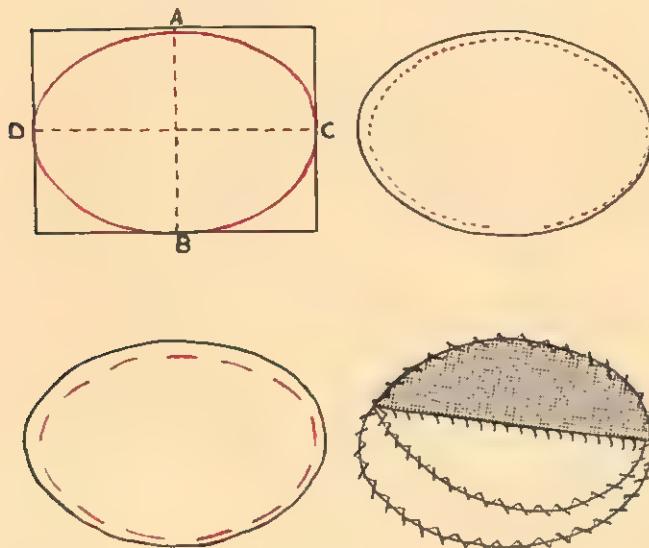


FIG. 37
Nightdress Case

Curve from *G* through *F-H*.

$$A-I = \text{one-half } A-G.$$

$$B-J = \text{one-half } B-H.$$

Cut out the pattern.

Cut out two pieces of material the size of the pattern. Pin the two pieces together and tack from *I* through *F* to *J*. Run-stitch or machine $\frac{1}{4}$ in. in from the edge from *I* through *F* to *J*. Press open the turnings; fix narrow hems from *A* to *I* and from *B* to *J* on both sides of the bag; hem in position. Turn and tack a single fold at the top edges of the bag. Turn a 1 in. hem round the top of the bag and tack through the hem $\frac{1}{2}$ in. below the top edge.

Use two rings for the handles. These may be bought in all colours and sizes. For this bag use

rings which are about 5 in. in diameter. Slip the ring into the hem and pin the hem into position over the ring. Stab stitch through the edge of the hem to hold the ring in position. Fix the second ring in the same way.

Child's Feeder and Bib

These may be made from pieces of towelling or other suitable material.

To Make the Feeder. Cut out the feeder to the desired shape (see Fig. 39).

Bind round all the outside edges with tape or coloured washing ribbon.

Bind round the neck edge leaving ends of ribbon 9 in. long (see diagram).

The feeder may be trimmed with *appliqué* work or decorative stitchery.

To Make the Bib. Cut out the bib in double material to the required shape (see diagram).

Pin and tack the two pieces together all round the edges.

Run stitch round the edges leaving 3 in. unstitched.

Snip the turnings as shown in diagram.

Turn through to the right side and tack the two thicknesses together with the seam at the edge.

Work a decorative stitch round the edge.

Fasten with a linen button and worked loop.

Child's Knickers

A baby frock, made from embroidered flouncing, which has become too small is used for this garment. The knickers are cut from the skirt section.

Specimen Pattern for Child of Five Years

To make pattern (see Fig. 40)—

$$A-B = \text{one-half the width of knickers, 18 in.}$$

$$A-C = \text{one-quarter of the height plus 2 in.}$$

$$B-D = \text{one-quarter of the height plus 2 in.}$$

$$A-E = 2 \text{ in.}$$

$$B-F = 2 \text{ in.}$$

$$A-G = \text{one-half } A-B.$$

Curve from *G* to *E* and *G* to *F* for the back waist line of knickers.

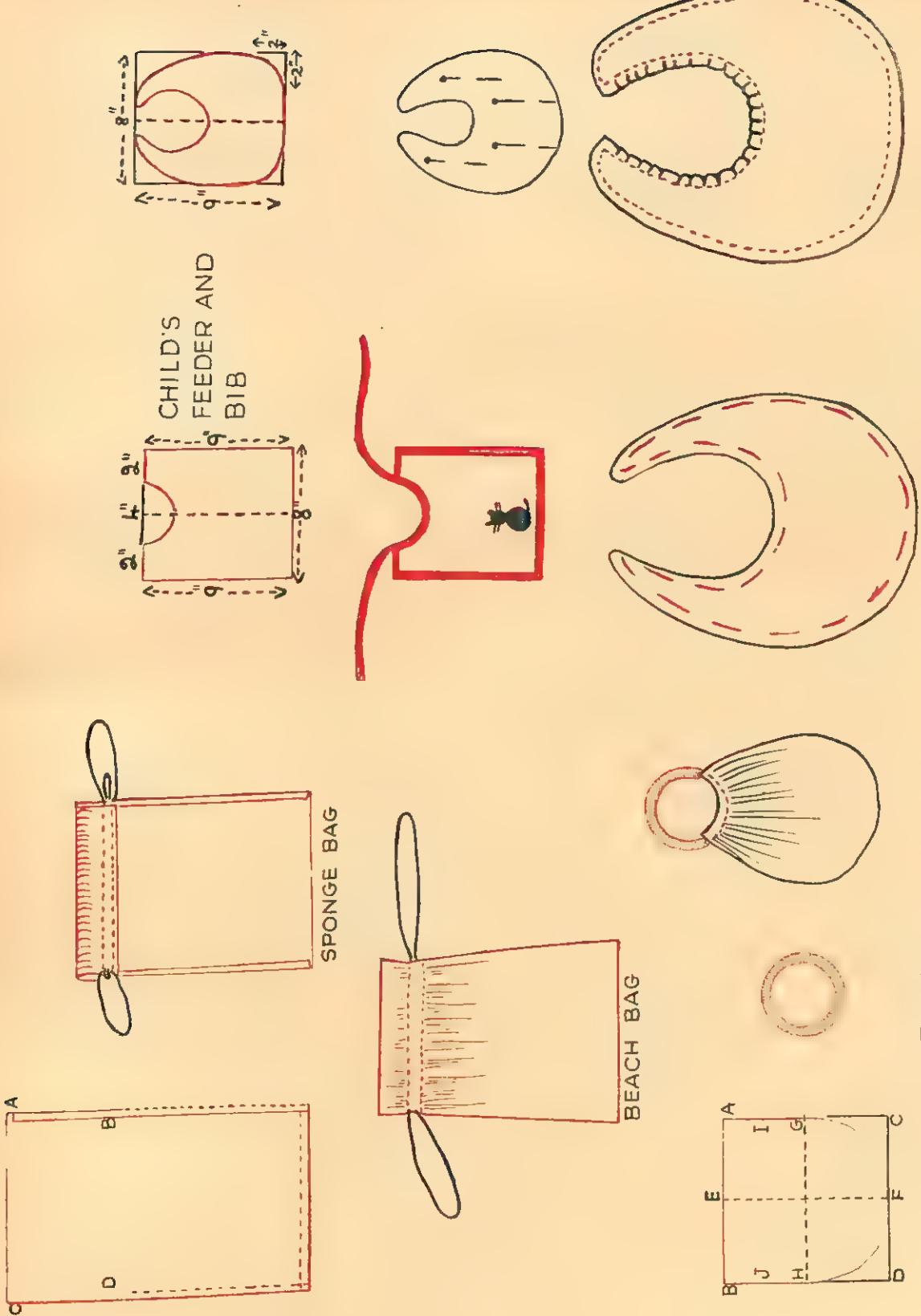


FIG. 38
Sponge Bag and Beach Bag made from Worm Garments

FIG. 39

Rule from *E* to *F* for the front waist line of knickers.

C-H = one-half *C-D*.

H-I = 3 in.

To Cut Out the Knickers

For the gusset cut two pieces of material 4 in. square.

Lay the paper pattern on to the material.
Pin into position.

Cut out, allowing $\frac{1}{4}$ in. turnings at the waist and side seam.

To Make the Knickers

Fold a single turn $\frac{1}{4}$ in. wide on to the four sides of each gusset. Lay the gusset on to the wrong side of the knickers as shown in diagram.

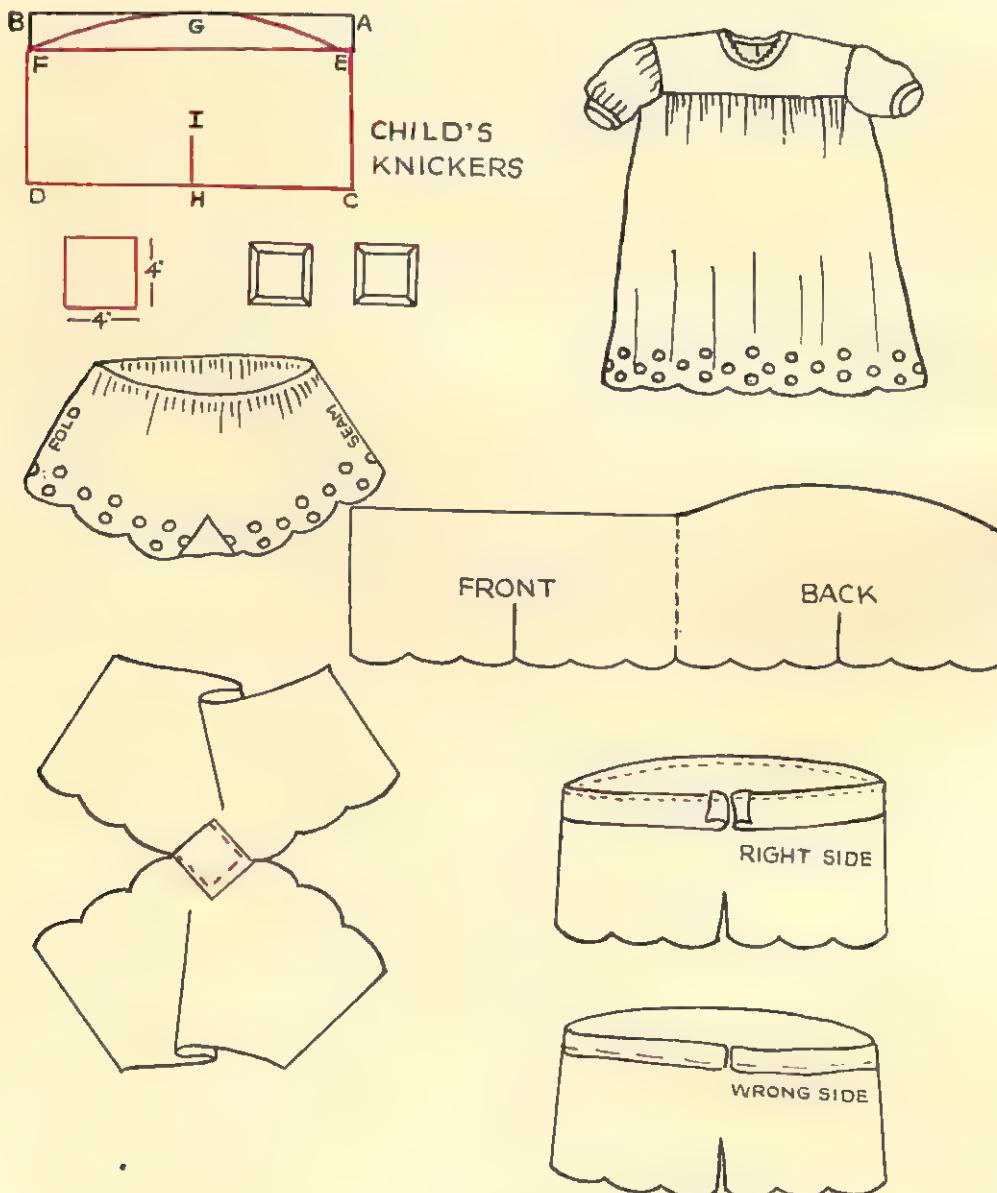


FIG. 40

Pin into position and then tack. Hem round the four edges. Turn to the right side of the knickers and set on the second gusset to cover the raw edges. Pin and tack into position and hem round the four sides. Join up the side with a narrow run-and-fell seam. The design of the embroidery must be made to match.

Cut some strips of material on the cross 1 in. wide. Join them together. Fold a $\frac{1}{2}$ in. turn on to the wrong side of one end of the strip. Place the fold edge of this turn to the centre front. Pin and tack the strip into position with the right side of the strip to the right side of the garment. Cut away the surplus length of the crossway strip leaving $\frac{1}{2}$ in. turning. Fold this turning on to the wrong side (see Fig. 40). Run stitch the strip to the garment $\frac{1}{2}$ in. away from the edge. Press the turnings upward towards the cross strip. Turn the knickers so that the wrong side is outside. Fold the crossway strip over on to the wrong side. Pin and tack into position with the seam exactly to the top edge. Fold a single turn $\frac{1}{2}$ in. wide on to the wrong side of the strip. Tack to the garment and hem round to finish.

Cut a length of elastic the size required and insert through the slot in the centre front. Over-lay the two ends of the elastic and seam the two edges together.

Slippers

These are made from a large felt hat, a worn velour coat, or some spare pieces of thick material.

Draw round the shape of the shoe to obtain the pattern for the sole of the slipper. Measure round the outer edge of this pattern and cut a paper pattern this length plus 2 in. by $2\frac{1}{2}$ in. wide. Plan on the patterns and cut out a pair of soles and two strips. Mark the right and left foot on each sole. Fold the sole in two and mark the centre with a line of tacking.

Mark the centre of the strip with a line of tacking. Place the centre front of the strip to the centre front of the sole and fix the two edges together, slightly easing the strip round the front

portion of the slipper. Tack toward the centre back on each half of the slipper. Overlap the edges of the strip at the centre back and pin two together. Join the strip to the sole with a $\frac{1}{4}$ in. tacking stitch, using Star Sylko No. 5 and a strong needle. With a contrasting colour of Star Sylko work a second row of tacking stitches,

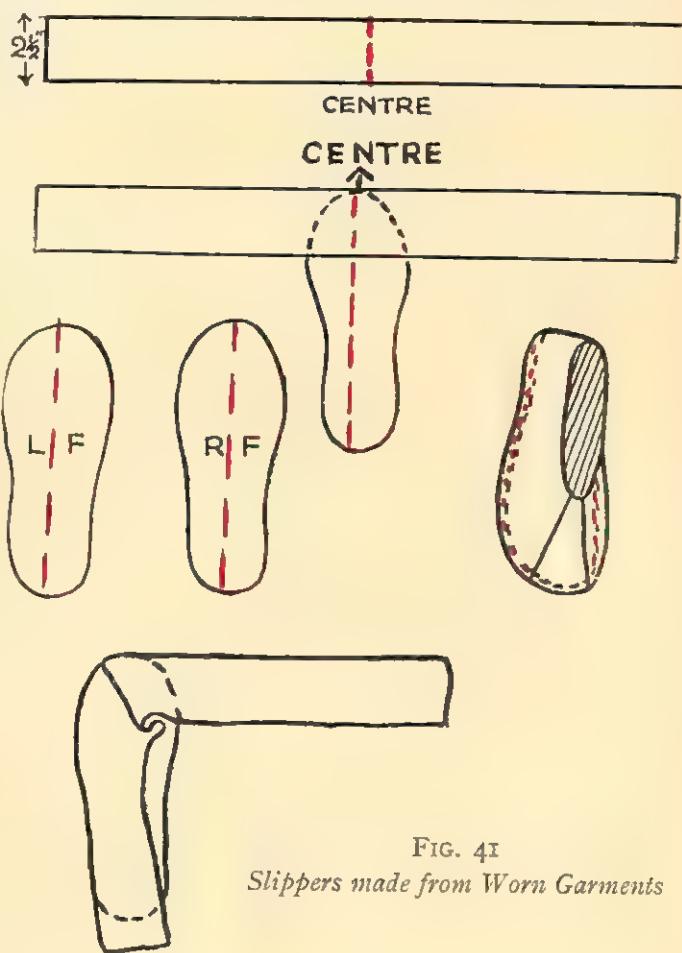


FIG. 41
Slippers made from Worn Garments

making the stitches over the spaces of the first row of tacking.

Fit the slipper over the foot and fix in two pleats at the front to make the slipper fit the foot.

If necessary repin the centre back of the strip to make the slipper a better shape. Stitch down each end of the strip to hold the edges in position.

Stitch the two pleats in position and cut away

any surplus material. Loop stitch all round the top edges of slipper with the coloured Sylko.

Make the second slipper in the same way.

Child's Swimming Costume (Thrift Project)

This can be made from the skirt section of a jumper suit, the jumper part being worn out.

Cut away the lining bodice from the skirt.

Unpick the hem and any stitching holding pleats in position. Iron out the creases.

Draft and cut out the pattern for swimming costume according to instructions given in the PATTERN MAKING section.

Plan out the patterns on to the material.

Pin in position and cut out the back and front, leaving $\frac{1}{2}$ in. turnings.

Place the back and front with the two right sides together. Pin one shoulder seam and the

two under-arm seams together, and tack $\frac{1}{2}$ in. away from the edge.

Run and back stitch on the tacking lines. Press the seams open. Tack the edges of the turnings to the garment and herring-bone the turnings to the garment. Join the seam across the lower edge of the garment in the same way.

Tack a single turn $\frac{1}{4}$ in. wide on the back and the front shoulder edges.

Neaten with a length of tape $\frac{1}{2}$ in. wide. Hem the tape to the garment at each edge.

Tack a single turn $\frac{1}{8}$ in. wide round all other edges of the garment. Loop stitch over the double edge with wool of a contrasting colour.

The child's initials or school badge may be worked on a separate piece of material. Cut out the badge to the desired shape and attach to the left-hand side of the garment.

Fasten the shoulder with two buttons and worked loops.

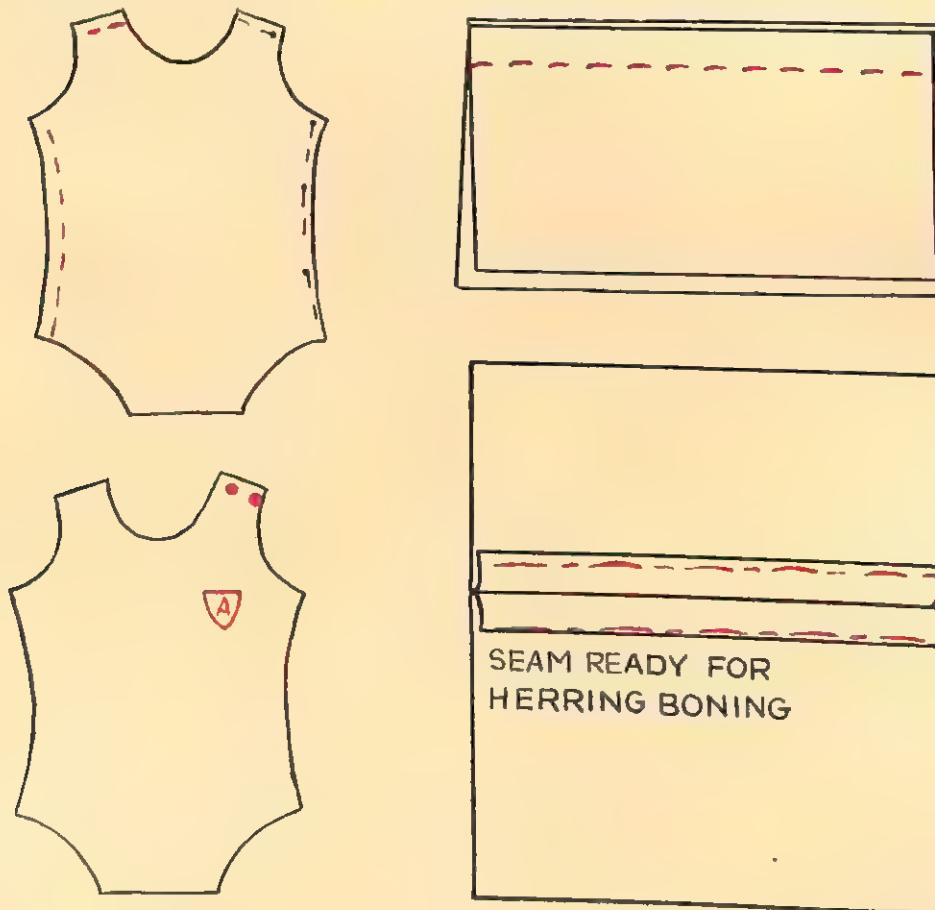


FIG. 42
Swimming
Costume cut from
Worn Skirt

EMBROIDERY

IT has been said that Needlework is at the very least a handicraft, at its best an art; and since during the past few years there has been a revival of interest in many forms of craft work in schools, it behoves us to create and maintain a real craft spirit in work so important to women.

Needlecraft has advantages over many other crafts. In the first place, the tools needed are few and inexpensive. Needles, scissors, and thimbles complete the necessary equipment, and the children should have made in the Junior School a needlecase, a workbag, and a desk-cover, so that their work can be kept clean and dainty, and their tools can be properly cared for. Secondly, the materials can be inexpensive and beautiful. In some cases old materials can be used, and nowadays there are many plain fabrics which are very cheap and yet excellent as a background for colour and pattern in embroidery. Thirdly, the finished articles are often necessities, not luxuries, as are leather bags, pewter work, etc., and consequently they are worth the money which can be spared with difficulty from the family budget. There is generally a market for clothes and household articles which are tasteful and well made and are sold at the price of the material. If the workmanship is sound they can hold their own with ready-made purchases where a certain amount has to be paid for labour.

From the aesthetic point of view, modern taste has grown simpler. In our houses, our gardens, our clothes, the elaborate ornamentation which, too often, was a disguise for bad workmanship has been replaced by a simplicity which cannot be achieved without a thorough attention to detail. Modern embroidery must use the old stitches, there are no new ones, but it uses them in the modern way. The feeling for line can be traced in embroidery patterns as much as in modern china or furniture or the Shakespeare Memorial Theatre at Stratford-on-Avon.

A further reason for interesting girls in embroidery is that, generally speaking, people

nowadays have a reasonable amount of leisure, and it is a social duty to teach children how to employ their leisure wisely. The girl who has once known the charm of wearing pretty under-clothes that she has made for herself is being safeguarded against the mistaken idea that leisure means lack of useful occupation.

Teaching Apparatus

As in needlework, so in embroidery, the teacher must collect teaching apparatus for purposes of

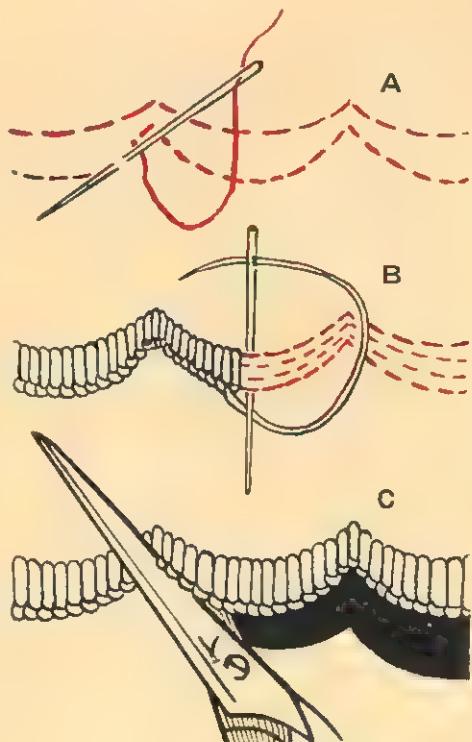


FIG. I

Teaching Apparatus for Scalloping

- A. Outlining.
- B. Padding and buttonhole stitch.
- C. Cutting the scallop.

demonstration, or much time will be wasted in teaching children individually what they can

learn collectively. When a section of the class is ready to use some stitch in embroidery, a lesson should be given on that stitch, and, from the beginning of her career, the teacher of embroidery should collect a portfolio of teaching apparatus for these lessons. Though the apparatus takes a great deal of time and trouble to make in the first place, it can be used over and over again for teaching the same process to

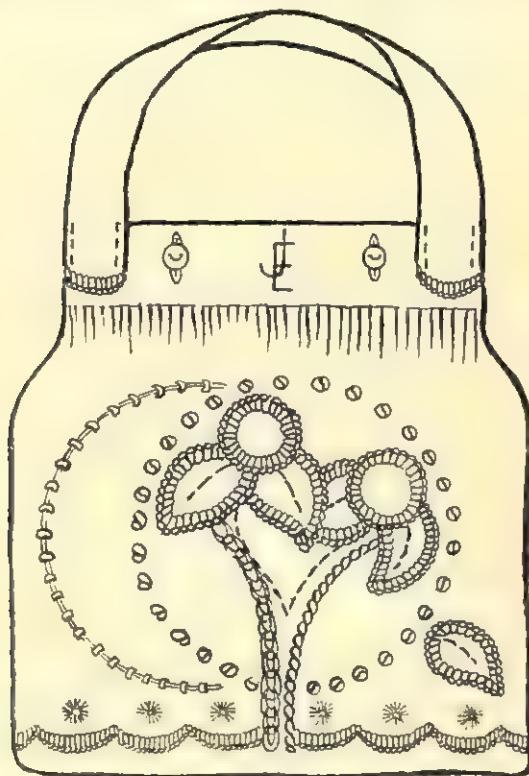


FIG. 2

Sampler Bag showing Various Embroidery Stitches

successive classes of children, or for individual children to refer to if they have been making some mistake, or if they find some difficulty.

The points to remember in this teaching apparatus are—

1. It must be sufficiently large to be seen easily from the back of the class when hung on the blackboard. Some loosely-woven material such as Hessian or Glamis cloth is suitable, as a large needle passes through it easily, and consequently it can be held properly while the

teacher is demonstrating. Bright-coloured rug wool shows up well against a neutral background, and a sail or felting needle will take this wool.

2. The different stages in the construction of a stitch should be shown clearly. For example, if scalloping is being taught the four stages should be demonstrated by means of teaching apparatus: (a) outlining, (b) padding, (c) working the buttonhole stitch, (d) cutting the scallop. Each scallop in the teaching apparatus should be about 6 in. across, if it is to be visible to the whole class.

Class Library

In order to stimulate the girls' interest, the teacher should collect books which will be of use either in teaching processes or in suggesting designs. It is good, for other reasons than that of teaching the girls how to embroider, that they should be encouraged to keep a needlework book which will be a companion volume to that which they keep in connection with their Domestic Subjects' instruction. In it they can paste any interesting articles that they have cut out of the daily newspapers, many of which have, from time to time, excellent articles on Stitchery and Design, written by experts. Such periodicals as *The Needlewoman*, *The Embroidress*, *Fancy Needlework*, *Good Needlework*, *Weldon's Practical Needlework* books, cards on various processes published by firms such as Pearsall's and D.M.C., leaflets published by the National Guild of Embroidery, all find their place in the class library. There are a great number of books on the various branches of embroidery.

Stitches

In the Junior School the children will have been taught most of the elementary stitches. Tacking, running, hemming, cross-stitch, blanket stitch, button-holing, herring-boning, and back-stitch can generally be taken for granted, and this is a very solid foundation for more advanced work in the Senior School. Much of the teaching will consist of the adaptation and combination of stitches already known, and, as embroidery is a craft, too much stress

cannot be laid on the necessity for practice, as the perfection due to practice is what must be aimed at. Consequently, all schemes of embroidery must include plenty of revision, and the girls should practise their stitches before they are allowed to use them on the garment for which they are intended. To obviate the drudgery of anything like the old-fashioned specimen, some type of sampler can be devised into which the girls can introduce the various stitches that they are taught. The sampler may take the form of a pin-cushion, a handkerchief case, a modesty vest, a case for keeping embroidery silks, a tray cloth. The papers that have been mentioned are prolific with suggestions for articles of this type. A bag which introduces a large number of processes and embroidery stitches is shown in Fig. 2. The stitches introduced are monogram, couching, appliquéd, scalloping, eyelet-hole, detached chain, stem-stitch. Needle-weaving could be done on the strips forming the handle. There is room on the other side of the bag for a different collection of stitches to be built up.

Scheme

A scheme should be drawn up for embroidery as for any other school subject, and it should conform to definite educational principles. It should be based on what the children already know, and it should show progression. The teacher should make up her own mind what stitches she wishes the children to know before they leave school, and the amount she considers reasonable for a year's work. She must be guided, to a certain small extent, by environment. In Durham or Wales, where quilting has always been a local needlecraft, for which there is revived enthusiasm at the present time, it would be sensible to introduce into the scheme a cot cover or a nightdress case in quilting. Where a flourishing Women's Institute is interested in any particular branch of embroidery such as needle-weaving or appliquéd, then, if it forms part of the embroidery scheme at school, the mothers who belong to the Women's Institute are interested in their daughters' work and will make an effort to provide suitable material. It is neither necessary nor expedient to teach

many kinds of embroidery. It is better to aim at beautiful work in a limited number of types, while at the same time the girls are encouraged to read intelligently, so that, if their interest has been awakened, they may pursue the subject further in their leisure time when they leave school.

Most schemes will include some of the following: stitches for decorating underclothes, dresses, or household articles, monograms, hem-stitching, Richelieu work, needle-weaving, punch work, quilting, lace-making.

Pattern-making and Design

To many teachers of needlework the question of design presents very great difficulties, because, in spite of being skilled needlewomen, they have not much artistic talent or training, and are accustomed to rely for their designs on transfers. Some people consider that it is excellent training in Art for children in the Art lesson and under the supervision of the Art teacher to make up the design which they are afterwards to use in their embroidery. This is admirable where there is an Art teacher, but in small schools, where one teacher has a class of girls from eleven years old to fourteen, if she has little creative artistic ability of her own, she will be wise to rely to a certain extent on good designs made by other people. It is too much to expect children of eleven to fourteen to produce sound designs without helpful suggestion and supervision; other design is hardly worth making permanent. Further, it is necessary to use good designs to train girls to appreciate beauty.

If it is possible to get a book with good illustrations of needlework, the pupils will gain much pleasure from adapting the designs to various uses. Transfers are often very artistic, and the girls should be taught to collect and use them. A very helpful book for those who wish to make their own designs is *Simple Stitch Patterns for Embroidery* by Anne Brandon Jones, published by B. T. Batsford, Ltd.

Stitches for Decorative Purposes

In these days, when fashion is constantly changing and underclothes are not made of

fabric which will last for years, it is sensible to teach the children to aim at achieving an effect without taking as much time as Victorian ladies did with their *Broderie Anglaise*, pin tucks, gathering and setting into bands. Decoration should serve a useful purpose, and should form an essential part of the design and cut. The material to be decorated should be taken into consideration, also the purpose of the garment: e.g. the decoration of underclothing should be flat and unobtrusive; the design for the decoration to be used on a dress for a slim girl should differ from that for a plump one. Stitches can be altered by the ingenious worker so as to produce different effects.

The children in the Junior School will probably have had a certain amount of practice in working chain stitch, and will easily learn its variations, of which four examples follow.

VANDYKE STITCH

This is worked by arranging the loops of the chain at an angle instead of in a straight line.

DETACHED CHAIN STITCH

This is produced if the needle is taken under the material at regular intervals after each chain stitch. It makes an effective spot stitch which lies flatter than a French knot, and is, in consequence, a more suitable stitch for use on underclothing.

FLY STITCH

The chain stitch is made open at the top by inserting the needle at a point the length of the stitch away from the thread.

Very probably this will be well known. The chain stitches are elongated and worked singly or in a circle.

COUCHING

This is very useful for decorating both clothing and household linen. It is a process by which one or more threads are held in place by small stitches at right angles. If contrasting colours are used the effect is enhanced.

CHEVRON STITCH

This is based on herring-bone. The method of working will be clear from Fig. 3, p. 153, but

detailed instructions of how to construct the less well-known stitches may be useful. Begin on the left with a horizontal stitch *A*. Bring out the needle in the middle of *A*, and make a slanting stitch to the right. Pass the needle to the left under a distance equal to half *A*, and over a distance equal to *A* to the right. This makes the lower stitch *B*. Come back to the middle of *B* for the second slanting stitch upward. Pass the needle to the left under a distance equal to half *A* and repeat the first horizontal stitch.

ROUMANIAN STITCH

This is a useful filling-in stitch which can be used to good effect when the space to be covered is too wide for satin stitch. At first children find it helpful to work the stitch vertically. Hold the thread under the left thumb and take a small piece of material on the right and on the left alternately, always inserting the needle from right to left.

CRETAN STITCH

The children will probably have used feather stitch or coral stitch. Cretan stitch, a development of this, gives variety and decoration. It is most easily worked vertically and the stitches must be of uniform length. Pick up equal-sized stitches on each side of two imaginary parallel lines—always pointing the needle towards the centre. In feather stitch the stitch lies along the imaginary parallel lines. In Cretan stitch it is at right angles to them. The appearance of the stitch depends upon the width between the parallel lines.

BERMUDA STITCH

This is useful for joining. The effect is that of drawn thread work, and if the work is good the join cannot be seen. For it a chenille needle and fine thread should be used. Tack together the two pieces of material to be joined, letting them overlap by about $\frac{1}{2}$ in. Work from right to left; pull the working thread very tight, so that some of the strands of the material are drawn close together, which produces the open-work effect. Work in squares, going twice over every stitch in the square. Take the first stitch from *A* to *B*, pass the needle to the point *C* and

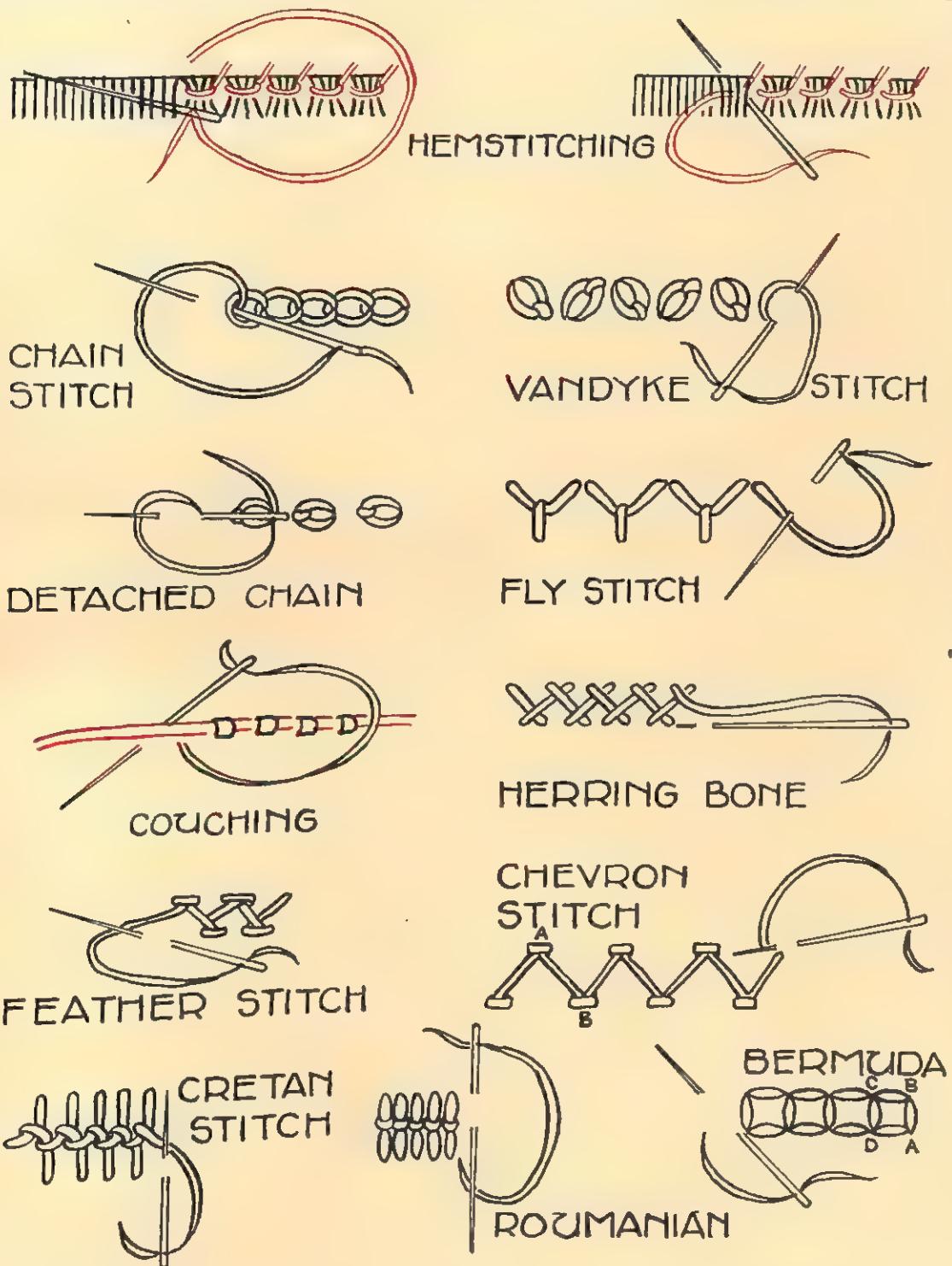


FIG. 3

Chart of Simple Embroidery Stitches

make two stitches over *CB*, pass the needle to *D* and make two stitches over *DA*. Bring out the needle at *D*, and the pattern can be repeated. If this order is adhered to, the back is as neat as the front, a point of great consequence in



FIG. 4
Composite Finish for an Edge
A. Buttonhole. B. Crochet.

finished embroidery. When the raw edges are cut away the firmness of the stitching is sufficient to prevent fraying.

HEMSTITCHING

This is a neat and often pretty way of working hems on material where the threads can easily be drawn. When the threads have been drawn, work from right to left. Begin with passing the

needle through the hem as in ordinary hemming. Slip the needle from right to left under a group of threads, draw it out, and put it round the group and upward from below into the folded edge.

This does not appear to be a very satisfactory embroidery stitch, although it has been so widely used in the past, as it weakens the material and makes no attempt to strengthen it again. Consequently there is an objection to using it for pillow cases, sheets, or cloths where the wear is heavy, through the constant necessity for washing, but the girls should learn how to do it and should include it in their chart of useful stitches.

COMBINED CROCHET AND BUTTONHOLING

An effective stitch for finishing off an edge is obtained by a combination of buttonhole and crochet. Work a line of buttonhole stitch on a tacked hem—working from left to right. Then working with the crochet hook from right to left crochet one double into the right-hand side of the first loop, two chain, one double into the

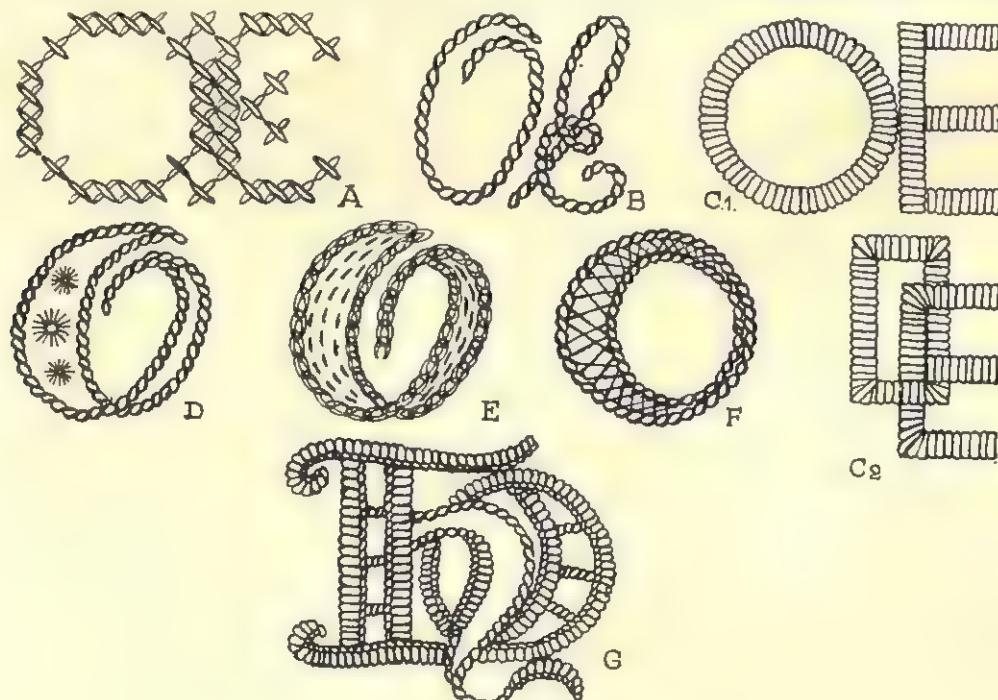


FIG. 5
Monograms of Various Types

left-hand side of the same loop. Repeat this in every loop of the button-holing. The more firmly this is worked the better the result will be.

A chart of the stitches learnt should be kept and added to as occasion arises.

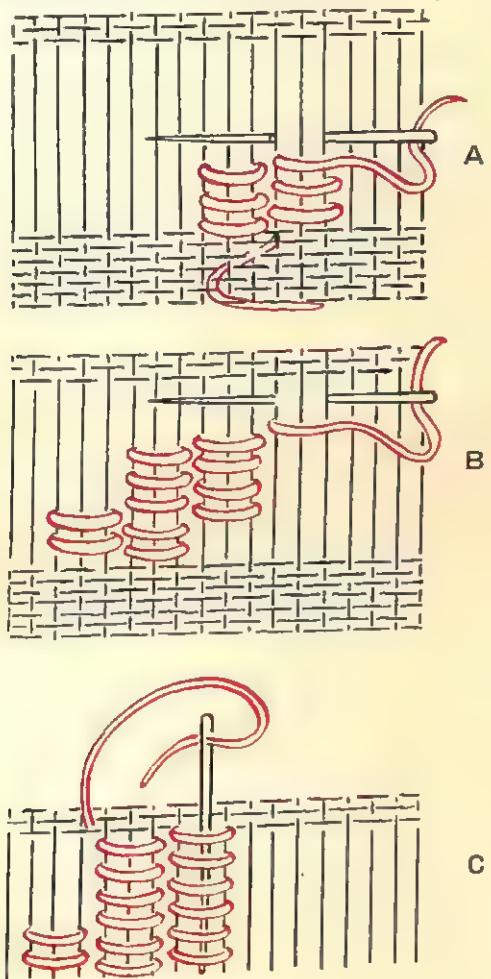


FIG. 6
Needle-Weaving

- A. Beginning.
- B. Passing to a new group of threads.
- C. Ending.

Monograms

Girls are always interested in working their own monograms, and, with a little ingenuity on the part of the teacher, a great many stitches which have already been learnt can be incorporated into the monogram sampler.

The easiest form of monogram is based on cross stitch, which has generally been used in the Junior School. There only remains the choice of the shape of the letters forming the monogram. Usually an old sampler can be produced from which the girls are very pleased to copy the cross-stitch letter.

Some suggestions for working monograms are shown in Fig. 5.

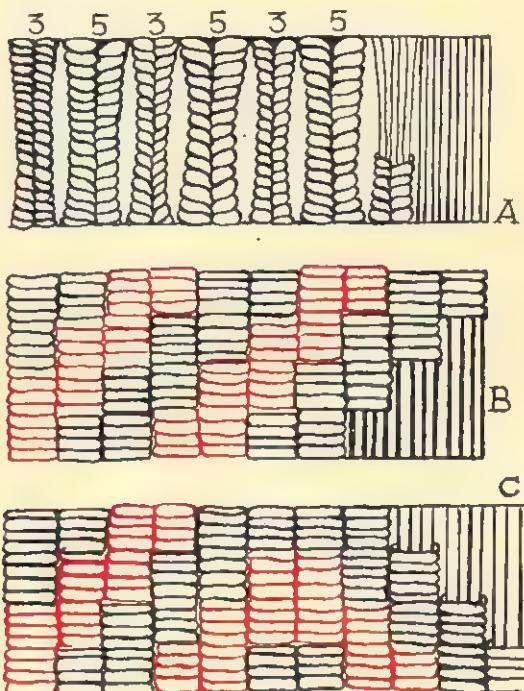


FIG. 7

Needle-Weaving Patterns

- A. Simple bars in one colour.
- B. Diagonal pattern in two colours.
- C. Zig-zag pattern in three colours.

A. Cross stitch—a round and a square letter have been used. These are very effective for house linen and huckaback and are quickly worked.

B. Stem stitch in outline has been used for this monogram with ordinary cursive letters.

C 1 and C 2. Two forms of plain printed initials are used here. They are worked with a correspondingly plain satin stitch. No. 2 looks very satisfactory when worked in silk on plain *crêpe-de-chine* or silk underclothing.

D. A more ornate letter. Outlined in stem

stitch and decorated with an odd number of eyelet holes decreasing in size from the middle to the top and bottom.

E. Another elaborate letter of the same type—outlined in chain stitch or couching. The space between the outlines has been filled by seeding.

F. A printed letter—outlined in stem stitch, ornamented by a line of herring-boning.

G. An elaborate letter introducing ladder-work. For this run finely and evenly over the part to be cut away. Buttonhole stitch must then be worked over the running, with the chain on the side that is to be cut. When the button-hole is worked along the second edge, the thread is carried across the bar and through one of the loops. Lay three threads in this way, bringing out the needle one loop further on, and then work over the three threads with close buttonholing. Care must be taken not to catch the material beneath in the bar, as this material will be cut away later.

Embroidered Badge

Now that so many schoolgirls wear blazers, it should be possible for experienced and careful workers to embroider the school monogram on the pocket. To obtain the highly-padded effect which is necessary for monograms of this kind, much more padding must be done, with padding thread which should be couched down before the satin stitch is worked over it. Padded work of this character needs to be most carefully pressed on the wrong side on a thick ironing blanket, so that the monogram will not lie flat but will have the required raised effect.

Needle-Weaving

Much interest has been taken in needle-weaving lately, and good work has been done in many schools. It is a satisfactory type of embroidery; for although the material is weakened by the withdrawal of threads, it is doubly strengthened later by these threads being woven.

As it is necessary for the threads to be counted, some coarse material must be used, and if the material is woven of threads of an even thickness, so much the better. Old Glamis cloth

works up very well, and Ardern's Star Sylko or Anchor Flox is suitable to work with.

Needle-weaving is darning under and over a certain number of threads.

In BEGINNING (Fig. 6A), leave a loose end of silk, to be fastened into the work when a column has been woven. It will be found convenient to take two or three running stitches, which can be taken out later, as shown in Fig. 6A. Work under and over a certain number of threads until the whole distance has been woven. Then the running stitches can be taken out and the loose end can be threaded through the needle and passed through the middle of the woven column.

The two difficulties experienced in needle-weaving are—

1. Keeping the tension even. If even tension is not maintained, the eye misses the rhythm and regularity, and one of the charms of needle-weaving is lost.

2. Disposing of the ends that occur wherever colour or pattern is changed. It is best to insist to children that these must be taken down the column, as this is the only way of keeping the work perfectly tidy.

PASSING TO NEW GROUP OF THREADS (Fig. 6B)

1. Work under and over the given number of threads as many times as required for one cluster. Then take the next group of three threads and continue working over and under the three new threads and three of the former group.

Fig. 6c. To show the method of ending, continue weaving until the whole of the drawn threads have been worked. Then pass the needle through the column so that the thread will be invisible.

This explains the method of needle-weaving. It appeals to children because bright colours can be used and a great variety of patterns can be planned. Fig. 7. (A, B, and C) shows how the work increases in difficulty.

PATTERNS

Fig. 7A shows simple bars which may be worked in one colour, the variety being obtained by using three threads for the first cluster and five for the next. This is suitable for narrow borders.



EMBROIDERY
HANDKERCHIEF CASE AND MAT

The pattern of the Handkerchief Case is from a sampler in the Fitzwilliam Museum at Cambridge, dated 1648.
The tassels were copied from a sampler cushion of the same period.
Both articles are the work of Senior Girls

Fig. 7B shows a diagonal pattern and is worked in two colours. The method of working being known, the only difficulty the children will meet will be disposing neatly of the ends of the variously-coloured threads.

Fig. 7C shows a zig-zag pattern. It is worked in three or four colours. To avoid constant breaking, the thread can often be pushed inside the column to the point where it is next wanted.

When the girls have reached this stage they will be able to work out their own patterns, which is a valuable exercise.

PLANNING A PATTERN

It will be necessary for working out a pattern to begin to plot it out from the middle of the material so that it will balance at the ends. When the number of threads to be used to form a group has been decided upon, it will facilitate working if, starting from the middle, the threads are lightly tied into multiples of the group, so that some idea may be gained of how the pattern will work out in the whole distance.

There will be threads left over at the end of most patterns, and it is good for the children to suggest methods of working straight bars of the various colours so as to dispose of these extra threads.

Appliquéd Work

This work is bold, and can be used to introduce the modern note of colour into bedspreads, cloths, and runners. It can also be used for underclothes and dresses.

Fig. 8 shows—

1. The fixing of the piece to be appliquéd into position by tacking.
2. The preparation of the outer edge by hemming.
3. The method of working the outer edge by buttonholing.

Couching can be used for veining if a more elaborate and less bold effect is desired, two threads being couched down for the mid-rib of the leaf and one thread for the vein.

Richelieu Work

Many of the stitches used in Fig. 9 have already been used in other types of embroidery.

The diagram shows the preparation for the work by outlining and padding, and the working of the blanket stitch, care being taken to work the purl edge where the material is to be cut away. Three methods of working the bars are given—A Buttonholing, B weaving or darning,

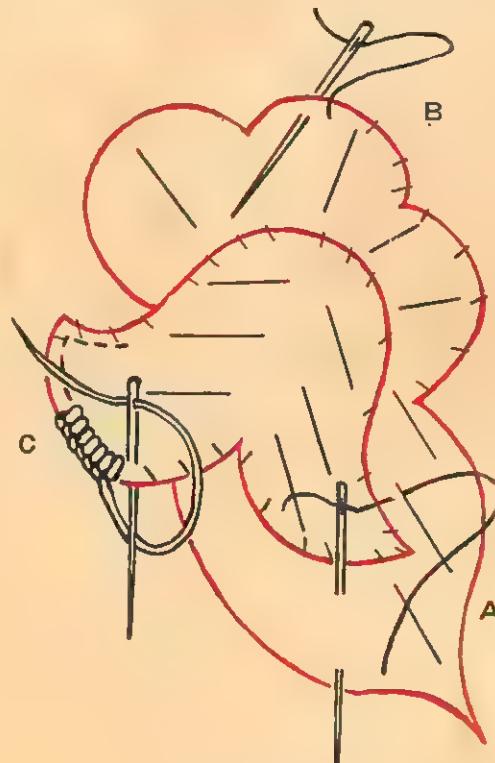


FIG. 8

Appliquéd Work

A. Tacking of appliquéd material.
B. Hemming.
C. Buttonholing.

as in needle-weaving, C over-casting, which must be done very firmly—the tension of the thread being kept absolutely even.

Community Work

From many points of view it is advisable to have a piece of community work on hand in a class. From a utilitarian point of view, in odd minutes, when a girl cannot get on with her own work because she needs help from the teacher, she can pick up the community work and get

practice in some particular stitch. Also odd colours of embroidery cotton can be used up to advantage—the girls being taught to see that the whole is not marred by the poor arrangement or choice of colour for a part. In the diagram the larger circles were drawn round a thimble and the very small ones round the end of a pencil. Community work should encourage originality; for, although everything must be

are developing the power of discrimination between poor and good work, and the ability to see is a great step towards the power to execute.

Scope and Value of Embroidery

Embroidery should not be kept in a watertight compartment, but should contribute to

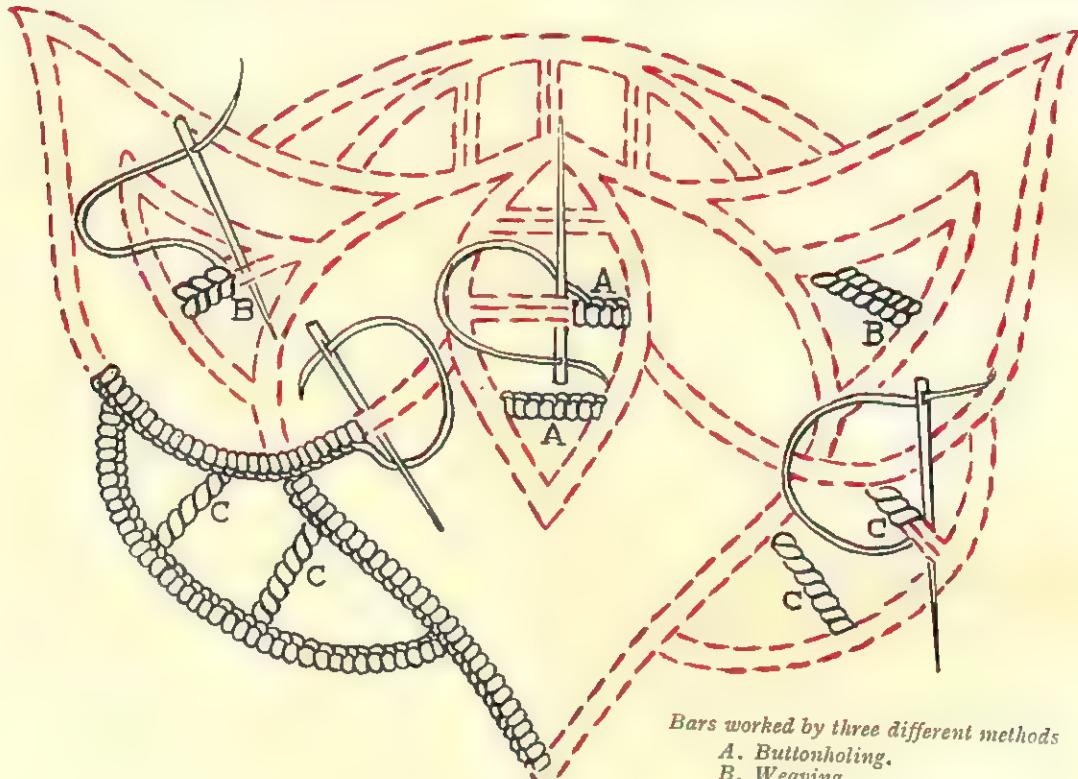


FIG. 9

Richelieu Work

Bars worked by three different methods

- A. Buttonholing.
- B. Weaving.
- C. Overcasting.

referred to the teacher so that the work will be considered as a whole, yet after the design has been indicated and the general theme decided upon, the girls should be allowed reasonable scope for originality in both execution of stitches and choice of colour. Community work helps to raise the general level of the embroidery, as that which is below the average is noticeable and is regretted by all who have taken part in the work and doubly so by the executant. This means that the weaker girls

the amenities of the Senior School. Table runners give a note of individuality to the classroom, piano backs in dyed Hessian, worked with brightly-coloured wool, add to the cheerful appearance of the Central Hall, embroidered curtains carry out the colour scheme in the teachers' room, banners to be used on gala days embroidered in the house colours are highly prized and increase *esprit de corps*. These can all be made by the Senior girls, who, when their work is for the delight or use of others, are

learning in practical form that education is a training for citizenship and that one ideal of citizenship is service by the individual for the community.

There should also be reasonable co-ordination with the other school subjects. The designs made in the Art lesson can be transferred to material and worked in the embroidery lesson. The Geography Scheme will include the study of the growth, transport, and manufacture of raw materials. This will stimulate greater interest when the materials are being used.

teacher. If the age of the child who worked the sampler is given, mention can be made of the greater care taken of children's eyesight nowadays, and it is a very short step from that to the consideration of the School Medical Services and the attention to the child's bodily development which is so prominent a feature of modern education.

The children should be trained to write clear and concise descriptions of processes. Their ability to follow directions given in needlework books is a test as to whether they have under-

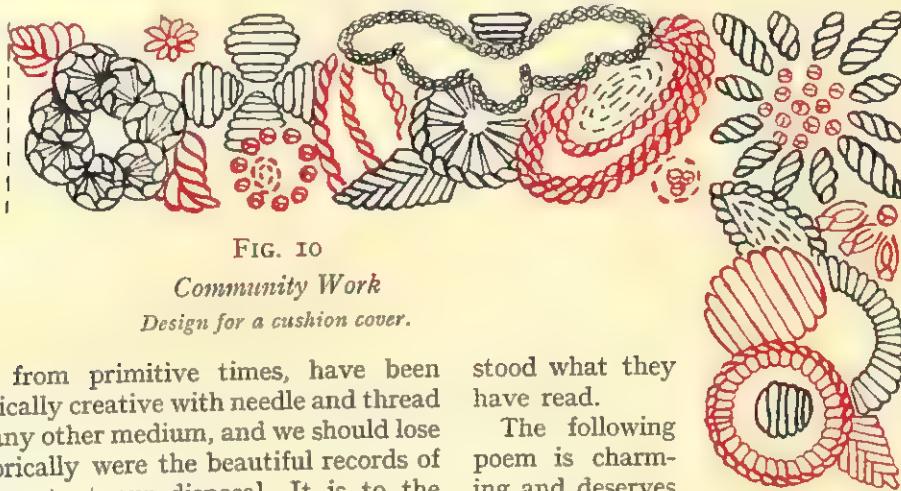


FIG. 10
Community Work
Design for a cushion cover.

Women, from primitive times, have been more artistically creative with needle and thread than with any other medium, and we should lose much historically were the beautiful records of needlework not at our disposal. It is to the skilful fingers of the ladies of the Conqueror's court that we owe the Bayeux tapestry. Its 230 ft. of embroidery is of great value not for the high quality of the sewing alone, but also for the accurate treatment of a wealth of detail. Though the children cannot see the original, there are excellent reproductions that are reasonable in price.

One history class took an immense amount of pleasure in reproducing part of it—mainly in appliqué and crewel stitch—to hang in the history classroom. The original is not tapestry but crewel work on linen, and this would have been too laborious for even the most enthusiastic children to attempt.

A sampler of Victorian days can be found in many homes, and if it is shown to the children they quickly realize that more leisure time was spent on needlework then. A comparison between modern industrial conditions and those more spacious days can be touched on by the

stood what they have read.

The following poem is charming and deserves a place in the private anthology of the girl who is interested in stitchery—

"THE SAMPLER"

Deborah Green at the age of eleven
Finished this sampler in eighteen-seventeen.
Up at the top is an elegant frieze
Of prim red flowers and Christmas-trees.
Down below are a pointed house,
Goose and turkey and cat and mouse;
A prancing stag and a dog or two,
And all the alphabet, done in blue.
These are a frame for a little rhyme,
Bidding her toil nor waste her time
When life's as short as a fading day
(Worked so nicely in black and grey).
Out-of-doors are the whirring wings,
Real live turkeys and dogs and things;
Lambs that gambol and clouds that pass;
Wind and sun in the April grass.
Quite the best sampler I've ever seen,
But oh! I'm so sorry for Deborah Green.

(Reprinted by permission of the Proprietors of *Punch*)

Another poem on the same topic is "Anne Everard," by Mary Webb.

The following books on embroidery will be found useful for reference—

Colour Pattern for Embroidery, by Anne Brandon-Jones (Pitman, 12s. 6d.).

Embroidery and Pattern Design, by H. Fowler and C. F. Craggs (Pitman, 7s. 6d.).

Elementary Embroidery, by M. Symonds (Pitman, 3s. 6d.).

Cross-stitch, by V. C. Alexander (Pitman, 2s. 6d.).

Embroidery and Design, by J. H. Drew (5s.).

An Embroidery Pattern Book, by M. E. Waring (8s. 6d.).

Art in Needlework, by Lewis F. Day (Batsford, 7s. 6d.).

English Embroidery Series—

I. *Double Running*, by L. F. Pesel.

II. *Cross Stitch* (Batsford). Each volume 3s. net.

Constructive and Decorative Stitchery, by Elizabeth Glasier Foster (Pitman, 4s. 6d.).

Embroidery and Design in the New Stitchery, by Elizabeth Glasier Foster (Pitman, 5s.).

The P.S.T. Embroidery Chart

The lovely design for an embroidery chart which accompanies this volume was intended

originally for a library panel. Although, naturally, it was designed for a wealth of colour, the study of its form is most interesting. It appeals to the modern embroiderer, who wishes her work to be done in reasonable time and who is influenced by the tendency of her day towards sweeping lines and vivid suggestion, and also to the one who finds her inspiration in traditional work and the beautiful stitchery of other days. The design has harmony and balance, and the underlying thought runs through the whole of the work and binds the separate units together.

The older girls in a Senior School who wished to leave some tangible momento of their school life could not find a more fitting gift than a banner of this type—though on a much less elaborate and ambitious scale. Parts of it could be copied and adapted to smaller articles, such as a back for the piano, a visitor's book for the school, a blotter for the head mistress's room. It is work of this kind that is an inspiration and a never failing aesthetic delight, and yet it fills the prosaic rôle of an encyclopaedia of stitches. The teacher who is not a practised embroiderer will find therein the solutions of many problems concerning conventional methods of representing various objects in stitchery.

KNITTING

KNITTING is a very ancient craft. The word comes from the Anglo-Saxon cnyttan—cnotta—a knot. It is said to have been a favourite pastime in Spain and Italy long before it was introduced into England in Queen Elizabeth's reign. History says that one of Henry VIII's wives was given a pair of hand-knitted stockings, and a knitting machine was made in Elizabeth's reign.

Appliances

Simple knitting is done on two pins or needles of the same diameter: the difference between the two is that pins have knobs at one end, and needles do not. Both are made of steel, bone, ivory, or a composition. Steel needles are mostly used for fine and close work, such as ties, socks, and gloves, as they do not snap with the closeness of the work, as bone would be apt to do. Wool, sold in 1 oz. or 2 oz. skeins, or thick embroidery silk or cotton, sold in $\frac{1}{2}$ lb. or $\frac{1}{4}$ lb. skeins, are the materials on which the pins or needles are employed.

It is also a good thing to have a knitting pin gauge (for judging the sizes of needles and pins) and a needle shield, also a knitting bag to keep the wool and work in, so that the former does not become tangled and the latter is not made dirty.

Wools

Practically anything can be made in plain knitting; the quantity of wool or other yarn required for each article depends largely on the thickness of the wool. This is almost always sold by weight, though "hanks" of varying weights can also be bought. Wools are made of twisted strands of thread, and are two-ply (two strands), three-ply (three strands), four-ply (four strands). The thicker the wool is, the more one would want for any article. There are also fancy wools for trimming, but it is not necessary

to describe these in this chapter. The size of the needles should also be taken into account, but not to the same extent as the thickness of the wool.

WOOL-BUYING HINTS

One should never buy wool to put away. Sufficient should always be bought, but it should not be bought simply because it is cheap, for moths are very partial to wool, and many a ball if put away for a long time will be found useless when wanted. The *best* materials should always be bought: they are cheapest in the long run.

HOW TO WIND WOOL

Before work is begun, the wool should be loosely wound into a ball, if it has not been bought so wound. Wool should *never* be wound tightly: this takes all the "goodness" out of it, by stretching it and rubbing off the nap. Corks should be kept on the ends of the pins or needles when not in use, as the sharp points are dangerous.

GENERAL HINTS

In joining wool, knots should not be made: the end of the old ball should be worked in with the new one for a few stitches, i.e. the end of the old ball and the beginning of the new one should be taken together over the needle to make the knot, and the surplus of the old ball is cut off at the back when sufficient has been securely knitted in (about 1 in.).

1st Stitch. It is better in most instances to slip-stitch the first stitch of every line—that is, slip the stitch from one needle to the other without knitting it: this makes a more even outline.

Never knit tightly: if there is any difficulty in putting the needle or the pin into the knot, the wool may be broken and its ply loosened. Soon it will wear thin and into holes.

I. Simple, or Plain, Knitting on Two Needles

CASTING ON

Make a slip-knot over one of the pins with your fingers. Now take the other pin in the right hand as if you were going to write, and put it into the loop on the left-hand side under the pin; put the wool over the right-hand pin, make a loop, and slip this on to the left-hand pin: continue making stitches thus for as many

CASTING OFF

Knit two stitches, and pass the first stitch over the second, knit a third stitch, and draw the second over this. Continue doing same until all the stitches but one are off the needle: the last stitch will be knotted by the length of wool cut off.

A Knitted String Bag

(Fig. 1.) Having practised simple knitting on something easy, such as a belt or some reins,



FIG. 1

Knitted Bag of String in Plain Knitting, but on Two Different-Sized Pins

as required. Hold the pin containing the requisite number of stitches in the left hand, and start to knit with the right pin. Put the right-hand pin into the first stitch on the left-hand pin, and make a loop as before, but, instead of slipping it on to the left pin as another stitch, keep it on the right-hand pin: it will thus be looped over the first stitch, or "knitted." Continue plain knitting to end of the row, turn, and repeat the process for as long as wanted, or until another stitch is required, or another coloured wool has to be worked in, or increasing or decreasing is necessary (see later in chapter).

the less adept pupils could well make a knitted bag of string. String is quite a good medium with which to knit, and the bag shown in Fig. 1 is executed in plain knitting, but on two pins of different sizes. This makes a very open stitch, just the thing for a bag which can be used for shopping, carrying wet bathing dresses, or a piece-bag; if lined when completed, it can be used as any kind of bag.

MATERIALS

You will require two balls of fine string in whatever colour you fancy; one very large

knitting pin, the largest made, and another number nine or ten. Cast on 100 stitches on the thin pin. (You can, of course, cast on more or less, if preferred.) Then take the large pin and knit all the stitches on to this. Continue knitting first on the thin pin and then on the coarse until the strip is $\frac{3}{4}$ yd. deep. Add another ball of string if the bag is to be longer.

An Important Note. Two balls were sufficient for the example, and cost threepence a ball: but

Scarf Knitted with Two Coloured Wools

(Fig. 2.) Having discussed the plain knitting stitch, also how to apply it with a thick and thin pin, we will take a very easy pattern worked in two coloured wools. The principal thing one has to guard against is the twisting of the two balls, but, if these are straightened out after each row is done, there should not be any difficulty. Some



FIG. 2

End of Scarf, showing Plain Knitting with Two Coloured Wools

Note—this end shows EXACTLY two ounces, one of each colour, used with number 12 knitting pins.

balls of string vary, so no hard-and-fast rule as to quantity can be laid down.

Cast off, and either sew the sides together or bind. A double cord run through the top acts as a draw string.

Dish Cloths

Very useful dish cloths can be knitted in this way with a small ball of string. Such cloths are very cheap to buy, but, to any pupil who is not very confident over her work, the making of these large stitches should be a great help. Besides which, she is making something useful, and not something to practise upon. This makes all the difference to the worker.

patterns are worked with half-a-dozen colours, and we are only going to work with two, so it should not be intricate.

MATERIALS

Buy $\frac{3}{4}$ lb. of four-ply wool, of whatever colour required, and 2 oz. of a strong contrasting colour: the example is worked in fawn and red. A pair of number 12 or 13 knitting pins, steel or bone, are used.

To MAKE

Cast on 75 stitches in the red wool and work 6 or more rows in plain knitting. The rows of any particular colour should be even numbers: working in the other colour wool on the ridge will not look nearly so nice in coarse knitting as

if it is added on to the loop. Join in and knit 2 rows of fawn wool. Knit 6 rows of 5 red, 5 fawn stitches alternately to the end of row. When on the wrong side keep the wool towards you, putting it away from you only when in use: when on the right side it is away from you all the time—the uneven number is the right side. In changing from one colour to another, let the strand of wool pass over the one just used.

4th Row. Knit back colour over colour.

5th Row. 13 fawn, 3 red, 5 fawn, 2 red, 8 fawn, 2 red, 2 fawn, 4 red, 5 fawn, red to end of row.

6th Row. Knit back colour over colour.

7th Row. 13 fawn, 3 red, 5 fawn, 2 red, 8 fawn, 2 red, 2 fawn, 4 red, 5 fawn, 3 red, 1 fawn, 1 red, 6 fawn, 3 red, 6 fawn, red to end of row.

8th Row. Knit back colour over colour.

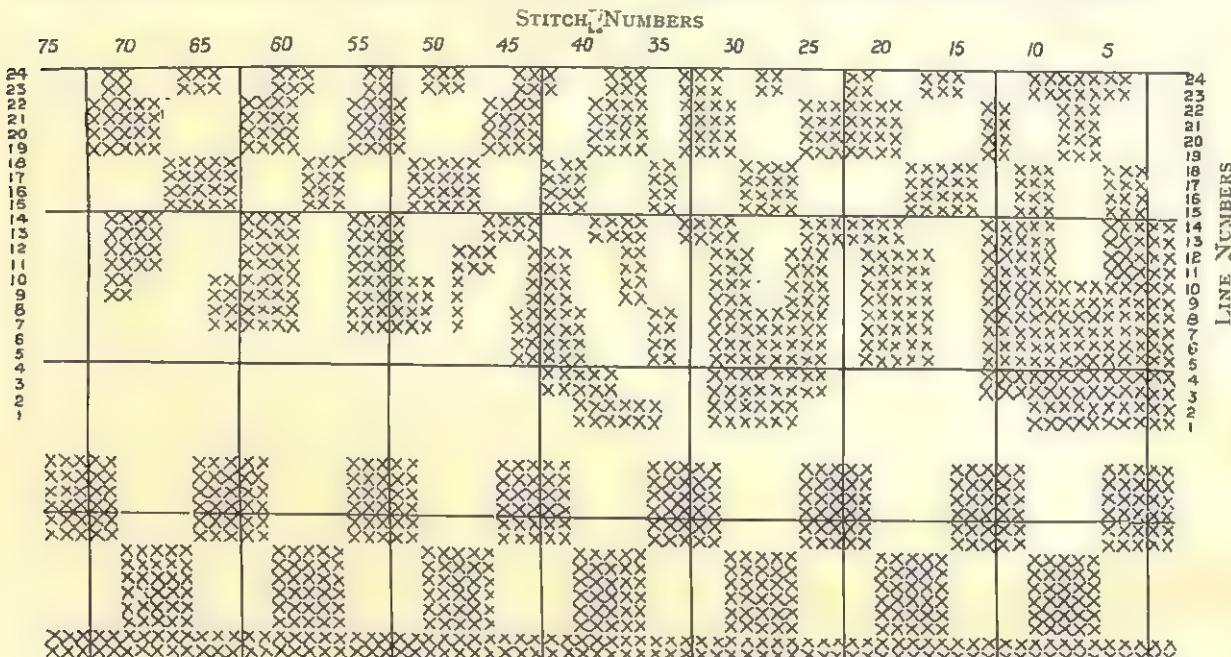


FIG. 3
Chart of End of Scarf

This pattern has been carefully built up so that from this chart Senior pupils can evolve their own designs. It will be noticed that the dividing lines start between the second and third crosses, and are placed at intervals of ten crosses. This is done so that variations of the pattern can be obtained, the worker using, say, the pattern between stitches 3 to 12 only, in that case fitting in the dice on the third cross—or omitting the dice.

The crosses represent fawn wool.

Work very loosely, so that the loop of wool on the wrong side is slack and does not make an uneven ridge.

Next knit 6 rows of 5 fawn, 5 red stitches, alternately, to the end of each row.

Knit 2 rows of plain red.

1st Row of uneven pattern: knit 10 fawn, 15 red, 6 fawn, 3 red, 6 fawn, then red to the end of row.

2nd Row. Knit back colour over colour.

3rd Row. 13 fawn, 10 red, 8 fawn, 6 red, 5 fawn, red to end of row.

9th Row. 13 fawn, 3 red, 5 fawn, 2 red, 3 fawn, 2 red, 3 fawn, 4 red, 2 fawn, 3 red, 3 fawn, 2 red, 3 fawn, 3 red, 6 fawn, 3 red, 5 red, 2 fawn, red to end of row.

10th Row. Knit back colour over colour.

11th Row. 5 fawn, 3 red, 5 fawn, 3 red, 5 fawn, 2 red, 3 fawn, 2 red, 3 fawn, 4 red, 2 fawn, 3 red, 3 fawn, 2 red, 3 fawn, 3 red, 4 fawn, 3 red, 4 fawn, 5 red, 4 fawn, red to end of row.

12th Row. Knit back colour over colour.

13th Row. 5 fawn, 3 red, 5 fawn, 5 red, 7 fawn, 4 red, 4 fawn, 2 red, 4 fawn, 3 red, 4 fawn,

5 red, 4 fawn, 3 red, 4 fawn, 5 red, 4 fawn, red to end of row.

14th Row. Knit back colour over colour.

15th Row. 2 red, 3 fawn, 3 red, 3 fawn, 2 red, 5 fawn, 7 red, 4 fawn, 4 red, 2 fawn, 4 red, 3 fawn, 4 red, 5 fawn, 4 red, 3 fawn, 4 red, 5 fawn, red to end of row.

16th Row. Knit back colour over colour.

17th Row—as 15th Row.

18th Row—as 16th Row.

19th Row. 5 red, 3 fawn, 3 red, 2 fawn, 5 red, 7 fawn, 4 red, 4 fawn, 2 red, 4 fawn, 3 red, 4 fawn, 5 red, 4 fawn, 3 red, 4 fawn, 5 red, 5 fawn, red to end of row.

20th Row. Knit back colour over colour.

21st Row—as 19th Row.

22nd Row—as 20th Row.

23rd Row. 3 red, 7 fawn, 4 red, 3 fawn, 3 red, 2 fawn, 4 red, 2 fawn, 2 red, 3 fawn, 2 red, 3 fawn, 3 red, 3 fawn, 3 red, 3 fawn, 2 red, 2 fawn, 3 red, 3 fawn, 3 red, 3 fawn, 3 red, 2 fawn, red to end of row.

24th Row. Knit back colour over colour.

Knit 8 rows of fawn and 2 rows of red.

The work will now be about 6 in. deep, and you will have used just about an ounce each of the two coloured wools. Continue working with the red wool, using up 10 oz.; then start the pattern at the other end of the scarf with 8 rows of fawn and work from the 23rd Row, making the 24th Row the 23rd, and so on until the pattern is completed. Fig. 3 gives the chart for the pattern, the crosses each representing a fawn stitch, and Fig. 2 gives the knitting of the 2 oz. of wool which were used for the end of the scarf.

It will be noted that the pattern is a very easy one, and it was designed so that any little piece of it could be taken and that alone worked as a pattern: for example, from 6 to 15 could be used only and repeated over and over again for as long as wished, with or without the dice. The idea will give girls a chance of showing what variations they can make for themselves from a given pattern. The scarf when finished should be about 1½ yd. long—it will be noted that "about" is emphasized throughout this chapter—different people knit in different ways, some tightly, some very loosely, so only approximate figures can be given. If wished longer add more red wool, each ounce making a difference of about 3 in.

II. How to Purl

Whatever was done in plain knitting, when purling this is reversed: thus a rib is made. With the exception of certain articles such as scarves, cot and pram covers, and a few others, knitting and purling look very much nicer used together, and even the articles mentioned above are often made in a rib stitch.

To purl: keep the wool in front of the work; put the right-hand pin in the work from right to left (reverse of plain knitting), the right-hand pin resting on the left-hand one; slip the wool over the needle as for plain knitting, but draw the wool through the loop backward on to the right-hand needle. Purling requires a little more practice than plain knitting.

STOCKING STITCH

This is made by working one row of plain knitting and purling the next. No ridges are to be seen with this method, and it is a favourite one for fine jumpers, vests, etc. It is called stocking stitch because the feet of stockings and socks are always smooth, but these are worked on four pins, and the method of working is somewhat different: this is explained later on in this chapter.

MOSS STITCH

This is a variation of plain and purl: work one purl, one plain for as wide as required, then in the next row plain over purl, and purl over plain; a charming kind of knot stitch is made.

A Cap

This is made of 2 oz. of wool, for less than 1s.

Hand-knitted caps or berets are more popular than ever, and one can have a number of changes for very little outlay. The hand-made beret with top-knot here illustrated costs 10d., and is one of the simplest to make, since there are no long instructions to follow as to increasing and decreasing, therefore it can be picked up at odd moments. It is, in fact, a perfectly straight piece of knitting.

This cap is made chiefly in moss stitch (see above). It takes just under 2 oz. of four-ply wool at 5d. an ounce, and a pair of number 13-gauge bone knitting pins are used.

TO MAKE THE CAP

Begin at the top by casting on 114 stitches, knit 1 row plain, then knit 2 plain and 2 purl in ribbing, for 12 rows; this is for the top-knot.

Next row, 1 purl, 1 plain, and continue in moss stitch for 8 or 9 in. Cast off firmly, but not tightly.

Now take a needleful of wool and join the sides of knitting neatly together by oversewing on the wrong side. Take another needleful of wool, double this time, and run a gathering thread at the base of the purl and plain ribbing,



FIG. 4
Knitted Wool Beret in Moss Stitch

draw up tightly and wind the wool firmly round the gathers two or three times, pass needle through and fasten off safely on wrong side. Turn up lower edge of cap to depth required, and the cap is completed.

The alternative depth for cap of 8 or 9 in. is purposely given, as there are so many different ways of wearing this style of headgear. Sometimes it is worn quite on one side of the head, and in this case very shallow head room is necessary; even less than 8 in. can be worked, and naturally this will take less wool.

PRESSING MOSS STITCH

This stitch looks better without being pressed, but if the cap is made in any other stitch it should be pressed. A jumper and cap in the above stitches for an average girl of 12-14 years of age will take $\frac{1}{2}$ lb. of wool for both, costing about 3s.

Shaped Articles

The three articles we have so far made have been in straight pieces, but mentioning jumpers brings one to the subject of increasing and decreasing. This is done in the following manner:

To DECREASE. Either knit 2 stitches together or cast off a stitch as described in the paragraph "Casting Off." In most cases, it is a question of personal preference. When decreasing in purling, it is usual to purl two stitches together.

To INCREASE. This is similar to casting on. Put the right needle through a stitch in the previous row, lying directly below the needle, and pull a loop through it. In purling, the wool is always towards one, therefore make a slip-stitch on to the needle with the wool, and continue purling from this.

Shaped Knitting

HOW TO MAKE A VEST

Hand-knitted vests last more than double the time machine-made ones do, and, of course, cost very much less. This cosy, trim-fitting vest for a girl of 12 to 14 years was made from 4 oz. of three-ply white wool on a pair of 13-gauge bone knitting pins, and costs less than 2s. (Fig. 5.)

Begin at bottom of front by casting on 80 stitches, knit 1st Row into back of stitches.

2nd Row. Knit 2, purl 2, and continue knitting in this ribbing for $2\frac{1}{2}$ in.

Now knit in stocking stitch for 20 in.

Next row knit 13 plain, purl 2, knit 2, repeat, leaving 13 stitches to knit plain at end of row. Next row purl 13 stitches and work in ribbing to last 13 stitches, which purl.

Repeat these two rows twice.

To Shape

Cast on an extra stitch at each end of the 7th and 8th rows to form under-arm fitting.

Continue with 15 plain each end, and purl and plain ribbing in centre, for six more rows.

Next knit 15, purl 2, knit 2, purl 2, knit 2, cast off 38, purl 2, knit 2, purl 2, knit 17.

Work backward and forward on this shoulder for 7 in., leaving off at neck end of row with stitches on a spare needle; break off wool.

Work the other shoulder to match, and for back of neck cast on 34 stitches and continue to work right across.

There are two things to be careful about: one is, see that your vest is not twisted before working on to second shoulder; and the second is to knit the end of wool in with the wool with which you are knitting for the first few stitches: this will strengthen the neck.

You will now have 80 stitches on your needle and can continue to work 23 plain each end with 34 ribbing in centre, as front: continue back in ribbing and plain to match front, then continue in stocking stitch until the outer edge of shoulder, from the 2 stitches cast on, measures $13\frac{1}{2}$ in.: cast off 2 stitches each end, leaving 76 on needle, and continue working until length under arm is the same as front, finishing with $2\frac{1}{2}$ in. purl and plain ribbing; cast off loosely. Press on wrong side with a damp cloth, join side seams neatly on the wrong side, and press flat.

Knitted Vest with Ribbon Shoulder Straps. There are two ways of knitting this: first, to knit each side separately as instructed above, until, as in the case of the front, the row is reached where the stitches (38) are cast off for the neck. The whole row in this instance should be cast off, and the piece of knitting put on one side while the back is worked exactly the same, except that the four extra stitches to form under-arm fitting will not be necessary. Instead, therefore, of casting on 34 stitches in the middle, these will be cast off with the others in the row. Ribbon shoulder straps are sewn in place after the two pieces have been sewn together at the sides. The back, if liked, can be made longer than the front, so that it comes higher up to the neck.

The other way of making the vest is on four large needles (see instructions for knitting on four needles). The vest will thus be made circular in one piece. Double the stitches for working on two needles, that will be 162 (two extra to make the number divisible by three),

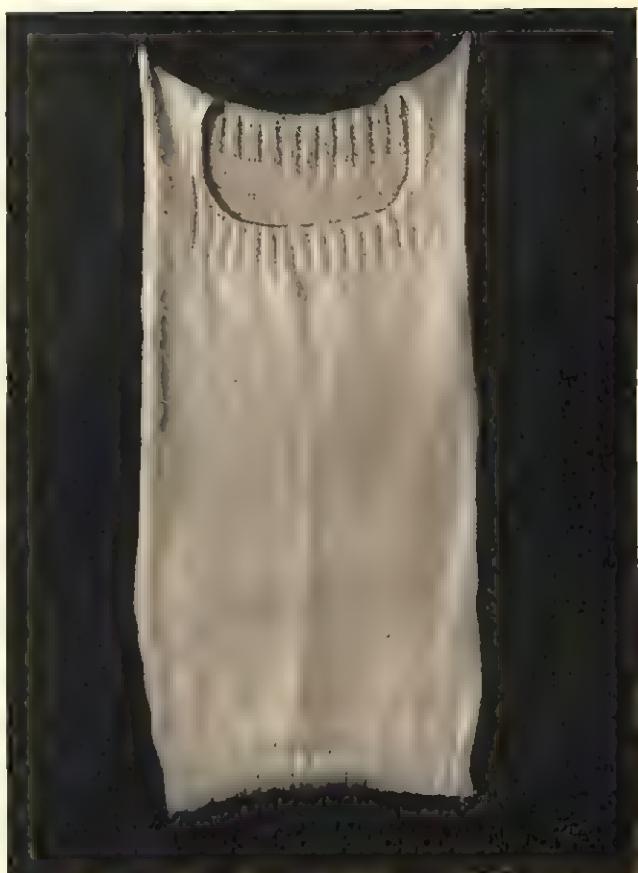


FIG. 5
Knitted Vest

54 stitches on each of the three needles. Work one row of plain knitting, then ribbing of knit 2, purl 2, for $2\frac{1}{2}$ in.

Knit in stocking stitch (in circular knitting, plain knitting all the time without any purl) for 20 in.

To make the vest fit easily, yet tightly at the top, work ten or more rows in ribbing at the top, and one row of plain knitting before casting off.

Add ribbon shoulder straps where wanted

—a little closer together at the back than at the front.

A Third Method. There is a circular knitting needle on the market which takes the place of the three needles, but it does not seem nearly so satisfactory as the three needles. However, in passing, it is worth mentioning.

III. Knitting on Four Needles

People have an idea that knitting on more than two needles is very hard. It is not at all, and rounded articles such as socks, stockings, and gloves could not be made on two needles,



FIG. 6
A Girl's "Tennis Sock"

as they simply would not "set." As a rule an equal number of stitches are cast on on each of the three needles, or, if the total number is not divisible by three, an equal number on the first and third needles, and the odd two stitches on the middle, or second, needle.

Knitted Socks

These and stockings wear very much better than any shop article, and a pair of sports socks for a girl can be made of 2 oz. of wool, with odd lengths of wool as an insertion at the top of the leg. The example is for an 8 in. foot, and was made with Paton and Baldwin's super Scotch four-ply wool, fawn, with green and brown insertion, a penny ball of each colour for each sock. The sock is worked on four steel knitting needles number 14 (Fig. 6).

TURNOVER TOP

The example is worked as a straight leg, that is, it does not allow the top to be turned over, as so many of the sports socks are made. This was done purposely to show the full length of the leg. If one wants the top turned over, the sock must be turned inside out after working 4 in. from the commencement, and the rest of the sock knitted on the other side. If the top of the sock is not to be turned over, continue all on the same side.

TO MAKE SOCK

Cast on 60 stitches, 20 on each needle. Work 1 row plain knitting : then 8 rows in rib of 2 knit, 2 purl. (Stitches in round knitting are not reversed for a rib: purl will come over purl : plain over plain.)

Join in brown, and work 2 rows, in ribbing. Join in green, and work 8 rows, the brown wool being used for the plain stitch, and the green wool for the purl, taking care not to drag the ribbing, and keeping the wool in use over the one just used.

Break off green wool, and leave a good length for fastening off when the sock is completed. Work 2 rows in brown rib, break off the brown wool as you did the green.

Continue working with the fawn wool in rib, until the work measures 4 in. from the beginning. Turn sock inside out (see note above), and continue to work in plain knitting for another inch.

TURNING A HEEL

This, with the exception of knitting fingers, is the most difficult part in any knitting, because, of course, the heel must not be "lopsided."

To make the heel, divide the stitches as follows—Put 30 stitches on the first needle; then equally divide the remaining stitches on the second and third needles, and leave them until the heel is turned—these are for the instep.

Work 20 rows of alternately plain and purl on the 30 stitches, always slipping the first stitch in every row.

Now comes the shaping of the heel—out of the 30 stitches on the first needle, knit 18, knit 2 together, turn, purl 9, purl 2 together, turn, knit 10, knit 2 together, turn. Continue working

in this manner until all the stitches are in a straight row again on the first needle: there should be 18.

Put the 30 stitches on needles 2 and 3 on to one needle, and put 9 of the heel stitches on to the first needle, picking up 10 stitches from the side of the heel piece. Do the same on the third needle, and knit one or two rows plain.

SHAPING FOR INSTEP

Knit plain to the last 3 stitches of the first needle, knit 2 together, knit 1.

Knit the second needle, with its 30 stitches, plain without shaping.

On the third needle knit 1, knit 2 together, then plain knitting to end of row.

Knit 1 row plain.

Continue working these 2 rows until there are 14 stitches on the first and third needles. Then continue working the foot until it measures from where the stitches were taken up at the heel—

$4\frac{1}{2}$ in. for a $7\frac{1}{2}$ -in. foot.

5 in. for an 8-in. foot.

$5\frac{1}{2}$ in. for an $8\frac{1}{2}$ -in. foot.

6 in. for a 9-in. foot.

SHAPING FOR THE TOE

Knit plain to the last 3 stitches of the first needle, knit 2 together, knit 1.

On the second needle knit 1, knit 2 together, knit plain to the last 3 stitches, then knit 2 together, knit one.

On the third needle, knit 1, knit 2 together, and knit plain to the end of the needle.

Knit 2 rounds plain.

Repeat these 3 rounds until there are 28 stitches on the three needles. Knit a round plain and cast off. Pick up the stitches with a needle and sew them together on the wrong side, tidy by sewing them into the back of the rib.

Press with a damp cloth, and make the other sock in exactly the same manner.

SOME HINTS ON STOCKING AND SOCK MAKING

Stockings and socks are all made similar to the above, though of course the larger the article is the more the stitches must be increased in proportion, but, once a sock or stocking is properly made, there will be little difficulty in

making another. Stockings, of course, have to be shaped over the calf. But this is just a matter of following instructions.

Never knot in wool: this remark applies to all knitting. Never work the bottom of the foot in ribbing: the reason for this is obvious. Some people work the heel with the wool double: this is advisable for socks and stockings which are intended for a very heavy wearer.

As a general rule, for stocking making the length of leg is $2\frac{1}{2}$ times the length of the foot, but this must not be taken for granted: hardly any two people have exactly the same measurements.

IV. "Mickey Mouse"

This toy, which is shown in colour in the colour plate facing page 208, is one that any child would love, and he is easy to make. He can be made any size you fancy, and from odd scraps of wool. His stuffing consists of cotton wool, ravellings of material, and odd scraps. One need not be too conscientious in following the directions given, as they are only rough, and can of course be improved on by the individual. A different colour scheme may appeal to many workers. No quantities of wool are given, as these depend on the size of the needles used, and how Mickey is dressed.

KNITTING INSTRUCTIONS FOR ONE HALF

THE FOOT. Use number ten or eleven pins, and work all in plain knitting. Begin at the bottom of the foot. Cast on 24 stitches, and knit 7 more rows, increasing by 2 stitches every odd-numbered row. There are now 30 stitches on the pins.

Knit 6 rows of 30 stitches each, then decrease the rows by 2 stitches every other row until there are 14 stitches on the needle. This completes the foot. In our example it is worked in orange wool.

LEG. Now take black wool and join in and work for 40 rows, neither increasing nor decreasing. This completes the leg.

KNICKERS. Join on the red wool: knit for 20 rows, increasing by 2 stitches every other row until there are 34 stitches on the pin. Work 10 rows without increasing.

BODY. Join on black for the body, and work

18 rows without decreasing: knit the next 10 rows, decreasing 2 stitches every other row: there should be now 24 stitches on the pin.

HEAD AND FACE. Knit 12 stitches in black wool, join on white and knit 12 stitches in this: knit back: repeat for 4 rows—

7th Row. Knit 10 black, knit 2 together, knit 12 white, make 2 white stitches this end.

8th Row. Knit back.

9th Row. Knit 11 black, knit 14 white, make 2 white stitches this end.

10th Row. Knit back.

11th to 14th Rows. Repeat 9th and 10th rows.

15th Row. Knit 11 black, make 1 black, knit 16 white.

16th Row. Knit back.

17th Row. Knit 12 black, knit 16 white.

18th Row. Knit back.

19th and 20th Rows. As two previous ones.

21st Row. Knit 10 black, knit 2 together, knit 16 white, and make 2 stitches this end.

22nd Row. Knit back.

23rd Row. Knit 9 black, knit 2 together, knit 18 white.

24th Row. Knit back.

25th Row. Knit 8 black, knit 2 black together, knit 16 white, knit 2 white together.

26th Row. Knit back.

27th to 30th Rows. As previous 2 rows.

31st Row. Knit 8 black, 15 white, knit 2 white together.

32nd Row. Knit back.

33rd Row. Knit 8 black, knit 13 white, knit 2 white together.

34th Row. Knit back.

35th Row. Knit 8 black, cast off the white stitches.

36th Row. Work back on the black stitches.

Rows 37-52. Knit these 8 stitches in black for these 16 rows, cast off.

This completes the one half of Mickey Mouse.

THE SECOND HALF is made exactly the same, as the knitting, being just plain, is reversible; so although the two pieces are made for the same side, when joined up the two sides are alike.

Join the two halves together, starting at the bend of the knickers: the black point at the top of the head at the back when joined together is pulled over to the front and joined on to the

white to make a point. Leave an opening for filling, join up legs and feet after they are filled (or before, provided an opening is left in each for the filling). See that the body is well fastened together, then make the rest of the members: Mickey so far has no arms, nose, mouth, eyes, or ears.

ARMS. Begin at bottom and cast on 18 orange stitches; knit back, increase every 2 rows by 2 stitches until there are 24 stitches on the pin, then decrease in the same way back to 18 stitches. Join on black and knit 30 rows without any change; cast off. Make other arm to match; stuff both and join up, and sew them on to the body.

NOSE. This is made by casting on 8 stitches, working for 6 rows: cast off, join up, stuff very loosely, and sew on to the middle of the face.

EARS are made of black wool: cast on 8 stitches—knit back; increase next 4 rows by 2 stitches in alternate rows; knit 24 rows without increasing, decrease next 4 rows by 2 stitches in alternate rows; cast off. Make the other ear the same. Do not stuff, but join sides together, and sew on to side of face.

MOUTH. This is made of black wool, back-stitched with a wool needle, after the body is stuffed, as big or as small as you wish. The **EYES** are made in satin stitch with the black wool.

AN ALTERNATIVE SUGGESTION

Many people may prefer to make back and front of the body separately, and join up at the sides instead of at the front and back; this is of course quite easy to do. The above suggestion is easier. Some workers also may like to make each part separately, and join to the next part with a needle. But even this they would probably find less easy than making Mickey as described above in detail.

If mistakes are made, so long as the body is not lopsided, it does not much matter.

Put a ribbon round Mickey's neck.

NOTE

To increase 2 stitches as has been suggested all the way through the instructions, it is as well to increase 1 stitch at the beginning of the row after the first stitch, and one at the end before the last stitch, unless otherwise stated.

V. Knitting Abbreviations

These are obvious, but in passing, one would just mention the most usual—

K. = Knit plain.

P. = Knit purl.

Wl. fwd. = Wool forward.

Tog. = Together.

M.S. = Moss stitch.

- is a sign of repetition, that is, when a certain amount of work has been done, repeat from the first star to the second star.

More difficult abbreviations do not come into the scope of this chapter.

VI. Washing Knitted Garments

It is of the greatest importance to wash hand-knitted woollen articles correctly. They must never be rubbed with soap, but should be moved about in a lather in warm water. Hot water shrinks wools and spoils colours. Rinse in clean water by moving the garments about, and never wring, but put in the middle of a cloth and loosely twist the ends of this.

Do not hang up to dry—even socks and stockings are better dried lying down, since the weight of the water in the wool pulls the garment out of place. If you have any fear of shrinking, pin the article out on a flat board. As most girls of fourteen and even under will have to wash their own small articles, they will find these few hints of use.

VII. Later Work

Knitting is a most fascinating craft, for craft it is—and as the worker progresses, she will want to try her hand at more difficult patterns, the basis of which is always plain or purl.

For later projects we would suggest—

Hot-water bottle cover.

Knitted baby's ball.

Knitted jumpers and slippers.

Jumper Patterns

There are many excellent books to be bought dealing entirely with jumper patterns, but here

are two easy patterns which any girl can copy, and which can be adapted to suit any figure.

A FEW GENERAL HINTS

It is often asked why, when the instructions for knitting a jumper have been followed, the finished article is so large that one cannot wear it. There are several solutions to this problem. The size needles or pins suggested may not have been used, the worker thinking one size larger would not matter, but it does—very much. Another reason may be that the individual is a very loose knitter and does not take this into consideration. Loose workers should use a smaller size needle and *vice versa*. Then, again, the wool might not be the right texture: this too would make a great difference. To make a knitted jumper "set" is largely a matter of common sense. Most jumper instructions tell one how many stitches go to a working inch, and if the right wool and pins be used there is not much fear of disaster. Here is a general rule for number of stitches to the inch which may help individual workers—

No. 14 pins—9 stitches No. 12 pins—8 stitches.
No. 11 pins—7 stitches.

Patterns and wool must be taken into consideration—a ribbed pattern will naturally have more stitches than a lacy open one.

From the hints above, it is seen that one cannot work blindly to a pattern unless the wearer has absolutely the measurements given in the instructions, and very few people have: it is quite easy, however, to add or deduct a repetition of the pattern, provided it is increased or decreased all round. Some people have long arms: others short—here again the worker must increase or decrease as is necessary.

PATTERN I

For Bust 34 in. cast on 108 stitches on No. 12 pins in four-ply wool. The patterns in Fig. 7 are worked in two coloured wools to photograph better. Working in one colour is naturally a little easier, but it is not at all difficult to work in the two colours, as will be seen. The two patterns we give can be adapted to any jumper instructions together or separately, and the illustration shows how exactly an ounce of each colour is worked up. The pattern can also be

used on scarves, pram covers, etc., so long as multiples of the number of stitches to the pattern are kept.

1st Row. Purl back on the 108 stitches cast on.

2nd Row. Rib of 2 plain, 2 purl.

3rd Row. Repeat 2nd Row.

(*NOTE.* Jumpers always seem to set better when there is a ribbing at the bottom—the length of ribbing varies according to the pattern and to individual taste, and can be K. 1, P. 1 instead of K. 2, P. 2. Two rows of ribbing are not sufficient, but are simply given as an example.)

K. 4. Repeat the P. 5, K. 4 until last two stitches at end; knit these 2.

13th Row. P. 1, K. 7 in darker wool, P. 2. Repeat the K. 7, P. 2 to last stitch; purl this.

14th Row. Knit whole row in darker wool.

15th Row. Purl back whole row in darker wool.

16th Row. K. 1, P. 7 in darker wool, K. 2. Repeat the P. 7, K. 2 to last stitch; knit this.

17th Row. P. 2, K. 5 in darker wool, P. 4. Repeat the K. 5, P. 4 until last 2 stitches at end; purl these.

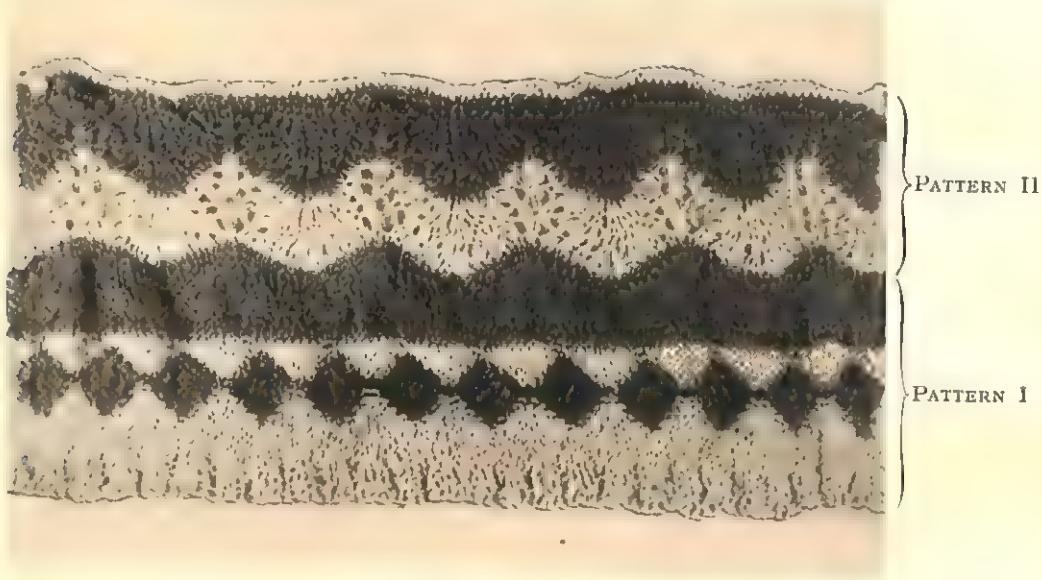


FIG. 7

Details of Patterns for Jumper

(*NOTE.* An ounce of each colour wool has been used.)

4th Row. Knit plain.

5th Row. Purl back.

6th-9th Rows. Repeat last two rows twice.

Now the pattern is started. It is multiples of 9 stitches.

10th Row. Knit 4 stitches, join in darker colour and purl 1 stitch in this. Knit 8 stitches. Repeat 1 P., 8 K. (the purl stitch in darker wool if second colour is used) until last four stitches at end; knit these 4 stitches.

11th Row. Purl 3 stitches, knit 3 in darker wool, purl 6. Repeat the K. 3, P. 6 until within 3 stitches of end; purl these.

12th Row. K. 2 stitches, P. 5 in darker wool,

18th Row. K. 3, P. 3 in darker wool, K. 6. Repeat the P. 3, K. 6 until last 3 stitches; knit these.

19th Row. P. 4, K. 1 in darker wool, P. 8. Repeat the K. 1, P. 8 until last stitch; purl this.

20th Row. Knit entirely in the lighter wool.

(*NOTE.* The darker wool should now show as a raised diamond pattern.)

21st Row. Purl back in the light colour.

Rows 22-32. Repeat Rows 10-20 all in dark wool. The diamond pattern will not, of course, be so distinct as in two colours, but it can be clearly defined. By mingling purl and plain in

a row the jumper (or other article) is given more spring, just as by purl and plain ribbing the mesh of the jumper is tightened up.

33rd Row. Purl back in dark wool.

34th Row. Knit plain in light wool.

35th Row. Purl back in light wool.

PATTERN II

The next pattern is an easy open-work one often called the "feather," and is quite a good one to mingle in with another pattern. If a mistake is made in working the lacets, the work need not be undone—altering is always a bugbear to anyone, especially young folk—as the mistake is not ugly, and does not affect the general design. Note the mistakes made purposely in the pattern in the light wool (Fig. 7). The lacets in the first pattern on the right-hand side are correct, but the repeats and the purl back are wrong in one row; but they are not unsightly, and no other row is affected by the error. Of course care must be taken to work the lacets rightly—the example is only to show what happens should a stitch be wrongly made.

The number of stitches cast on must be multiples of 18 and two extra stitches. If, when the pattern is being worked in with another, the number of stitches do not make up the 18, make an equal number of new stitches at each end in the row before this pattern is started. In this instance, an extra stitch at each end of the 35th row of the jumper has been picked up.

36th Row. K. 1, K. 2 tog. three times; keeping the wool forward, K. 1 six times; K. 2 tog. three times—repeat from K. 2 tog. until the last stitch; knit this.

37th Row. K. 1, purl to the last stitch, K. 1.

Repeat these two rows for as long as wanted—in this instance 6 rows—then join in the dark colour, using the same pattern for another 6-8 rows. Work 2 rows (plain and purl respectively) in the dark, and the same number in the light wool. You will have used up approximately an ounce of each colour wool, and your work will be approximately 8 in. long when pressed.

Continue as liked for the jumper, working in the above pattern to individual requirements.

Any scraps of wool that may be left over, wash and put aside for darning. This remark

applies equally to wool used for knitting socks as well as that used for jumpers.

In the directions above, for both Pattern I and Pattern II, the dark wool is introduced only when specifically mentioned with particular stitches.

Knitting in Two Colours

Keep the thread just used away from the needles, i.e. to the right, make a loop of the new-colour wool over a finger, and knit this in as if the original colour were being used. Pull tight, and continue knitting in the ordinary way with the new colour for as long as required, only knitting in the end of the wool for, say, six stitches, with that from the ball. This, of course, obviates any chance of the new wool's coming undone. When wishing to continue with the former coloured wool, take this over the back of the stitches in the second-colour wool, and so on. The secret of successful knitting with two or more coloured wools is to keep the work loose, and to take the wools over the back of the work.

Knitted Slippers

A pair of these can be quickly made, and each consists of one straight piece. Cast on 35 stitches in coarse 4-ply wool, on No. 12 needles (bone), and work for nine inches in plain, moss, or ribbing stitch. Cast off—1 oz. of wool should be just about enough. Join up the sides so that a little bag is made, slip a soft sole *inside*, and run an elastic or ribbon in the top. The slipper is now completed. Without the sole, the little pockets make useful bedsocks. This slipper is for a number four foot: for a larger slipper increase by six stitches for the next size—a little more than the 2 oz. of wool will then be required for the pair. For a smaller foot diminish in proportion.

A Hot-Water Bottle Cover

The same number of stitches (35) on the same pins, in the same coarse wool, will be wide enough for the commencement of a cover for

a rubber hot-water bottle. The same patterns can be used.

Knit the first row. *2nd Row.* After the first and before the last stitches, make one. *3rd Row.* Knit back.

Repeat rows 3 and 4 twice.

Knit plain (or ribbed or moss stitches) for half a yard (or to fit a specified bottle).

Then decrease a stitch after the first and before the last one by knitting together. Knit back.

Repeat these two rows twice, then knit one row plain.

Cast off six stitches, and work on the next six stitches for 1 in., leaving the rest of the stitches on the needle. Cast off and break off wool.

From the other end of the needle, cast off six

stitches, knit the rest; cast off until within six stitches, and knit on these six for 1 in. Cast off.

These two little tabs can have press studs or buttons sewn on them to keep the cover on the bottle—or the worker may prefer to omit these tabs altogether and cast off on a straight piece, as the casting on was done: an elastic can then be run along the top to keep the cover on the bottle. In this event, however, the cover should be made longer than the bottle, to allow for the gathering up.

3½ oz. of wool will be required for knitting a cover to an ordinary bottle with tabs, i.e. a bottle 9 in. long and 7 in. wide; but as hot-water bottles vary, these instructions can only be used as a basis for individual requirements.

SOFT TOY MAKING

AS a craft for Seniors there are few that can compete with Soft Toy Making, for it provides wide scope for originality and excellent practice in the acquisition of good technique, and makes successful school work from a purely practical point of view.

The "Soft Toy" may be considered the most popular modern toy. It has much to recommend it, being light and easy for the child to hold and in most cases extremely hygienic.

Soft toys may be large, small, simple, or elaborate; made very cheaply or with expensive materials. They will sell at school sales and also the scholars themselves will buy them when often needlework and craftwork of other kinds cannot be disposed of with any profit.

This craft may be approached in several ways—

1. As an end in itself, that is to make toys for a child or children.
2. To help the imagination in the study of history, geography, and literature.
3. In the needlework class the doll may be most successfully used as a fashion model to experiment on with different styles of garments.
4. For adult toys such as motor-car mascots, decorative dolls, and quaint animals to add colour and interest to modern schemes of interior decoration.
5. To obtain money for any purpose the toy stall at any sale will be found one of the most successful.

In considering Soft Toy Making as a craft for Seniors, it is felt that the most important things to encourage are originality and ingenuity. Therefore if a class start Soft Toy Making they should make two or three toys from patterns provided and after that should design their own, even if they are very simple.

Very little design for Soft Toys can be done on paper. A flat paper pattern may be cut, but the designer must experiment right in the material, as she is dealing with solid shapes and forms.

In this short chapter seven entirely different types of toys will be dealt with—

1. Toys made of circular, oval, and tubular shapes.
2. Silhouette toys.
3. Animals that stand on four legs.
4. Jointed toys.
5. Animals that sit down.
6. Puppets.
7. Dolls.

The diagram pattern of one or more of each of these types will be given and the materials required and method of making fully described. It is then hoped that the reader will be able to work out her own ideas and design her own toys.

General Instructions

MATERIALS

The choice and selection of material is of the utmost importance to the success of a toy. Material of almost any colour and texture may be used provided it is firmly woven, but it *must* be right for the particular toy it is to make. For instance, if the zebra (see Colour Plate I) were made of Turkey towelling and the lamb (Fig. 1) of striped print, the effect of both toys would be spoilt. Often pieces left over from the making of garments and the good parts of worn-out garments may be successfully used. Although toys made of expensive materials are very fascinating, for work in schools it is generally best to use the cheaper materials, as the toys then sell more readily.

Of the more expensive materials, *felt* is very successful and very easy to use. Delightful animal *baize* of different kinds can also be obtained, which makes toys like Rover the Pup (Fig. 1) most realistic.

The special materials required are few. Glass eyes improve some toys, but wooden button moulds, beads, and boot buttons make quite good eyes for toys which are intended for older children and adults. The thin wood in the chip baskets used for fruit can be cut into disks for joints in toys, and the metal washers are like those used in boat building and can be obtained

from any ironmonger. The wire is a medium-thickness galvanized wire.

Method of Obtaining Pattern

All the diagrams of patterns in this article are drawn on squares which each represent 1 in. To obtain the full-size pattern, rule a piece of any firm paper into inch squares: let there be as many squares each way as there are squares in the diagram. Now draw off each part of toy from the small diagram into the full-size inch squares by following the points of intersection of the pattern with the squared lines. The patterns on the small diagrams are drawn with a thick line; the outside edge of this line should be taken as correct for copying. All letters and other markings must be carefully put on the large pattern. Some of these letters on the small diagrams have had to be placed off the patterns, but their correct position is easy to see. Fig. 39, A and B, shows puppet's hand enlarged full size by above method. Great care must be taken with the drawing and cutting of these full-size patterns, or all the character of the toy will be lost.

Method of Cutting Out

First cut out every part of pattern, then hold or pin it firmly on to the wrong side of material and paint an accurate outline with a fine brush, using white paint if the material is dark, black paint if material is light. Cut out, allowing $\frac{1}{4}$ in. turnings (in most cases) outside the painted line. The toy is then tacked together and stitched on the line: this makes sure of a correct contour.

The first mistake made by most amateur toy-makers is to pin the pattern on material as in dressmaking, and cut out the toy—often most inaccurately—before removing the pattern. They then expect the toy to have all the nicety of contour of a toy which has been made with a carefully drawn outline.

Sewing Materials and Seams

Silk substitute in a matching colour is suitable for most toys, strong thread should be used for

sewing any part which is likely to receive strain, and ordinary sewing needles, crewel needles, and darning needles are required.

There are three kinds of useful seams—

1. For use on felt or any material which will not fray, cut material without turning and over-sew on the right side.
2. Allow $\frac{1}{4}$ in. turning and backstitch on outline by hand on wrong side.
3. As method 2, but machine seams on outline.

Machining is better than hand-sewing if the machinist is expert and can exactly follow the painted line—if she is not it is far better to back-stitch by hand.

Stuffing

One of the most common faults with amateur toys is that they are not properly stuffed—the stuffing *must* be put in in small pieces and be very firmly pushed down. A meat skewer is a good tool for this.

Kapok is best for the smaller toys, and wood wool for the more elaborate and jointed toys. If expense is an important consideration, other things can be used. Rags picked in small pieces will do, but they are inclined to be lumpy, however careful the worker is, and the slightly modelled effect which is such an important feature of a successful soft toy cannot be obtained as with kapok. Sheep's wool, if it can be collected by children in the country, is very good for stuffing; it must be washed and thoroughly dried.

Accessories

These, such as eyes, noses, ears, and tails, are very important and require great thought and care.

The difference between a tail wired or hanging limp or an eye with or without an eyelid may change the whole character of a toy.

The cost mentioned in connection with each toy is only approximate, and is largely influenced by the amount of scraps of different materials which can be used up. All special materials may be obtained from The Dryad Handicraft Dept., 42 St. Nicholas Street, Leicester.



Rover the Pup



Peter Lamb

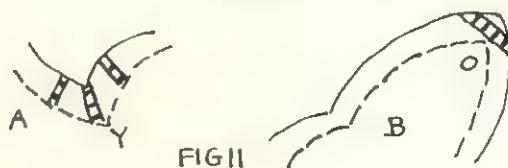
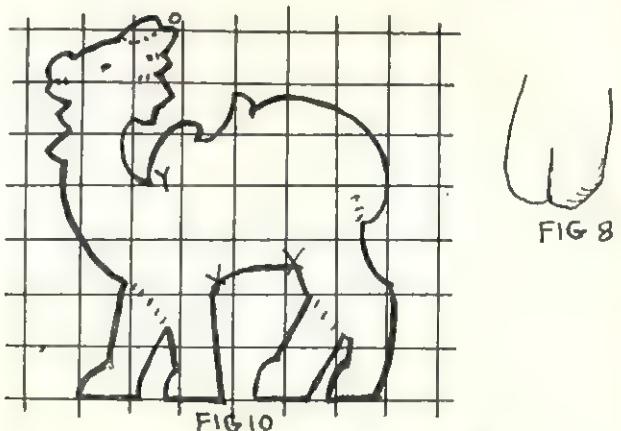
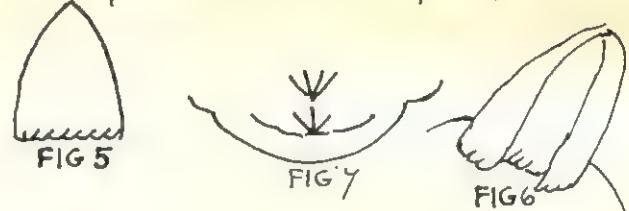
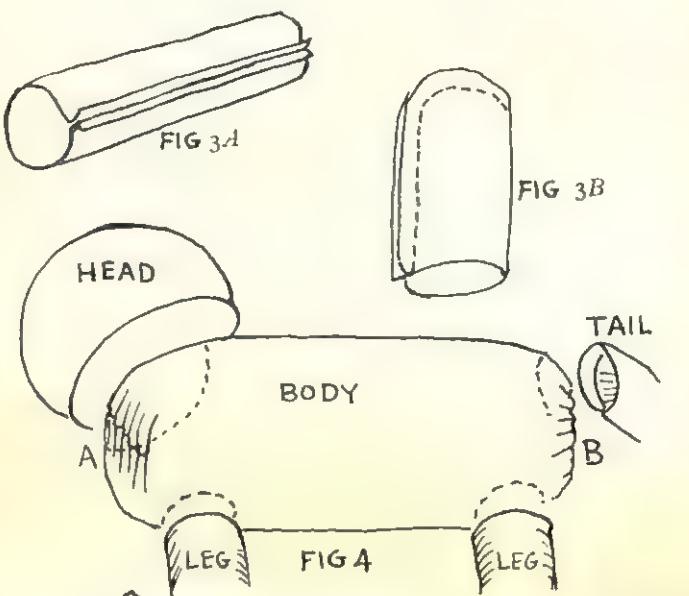
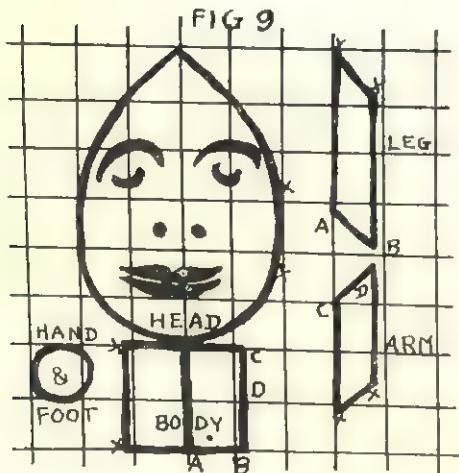
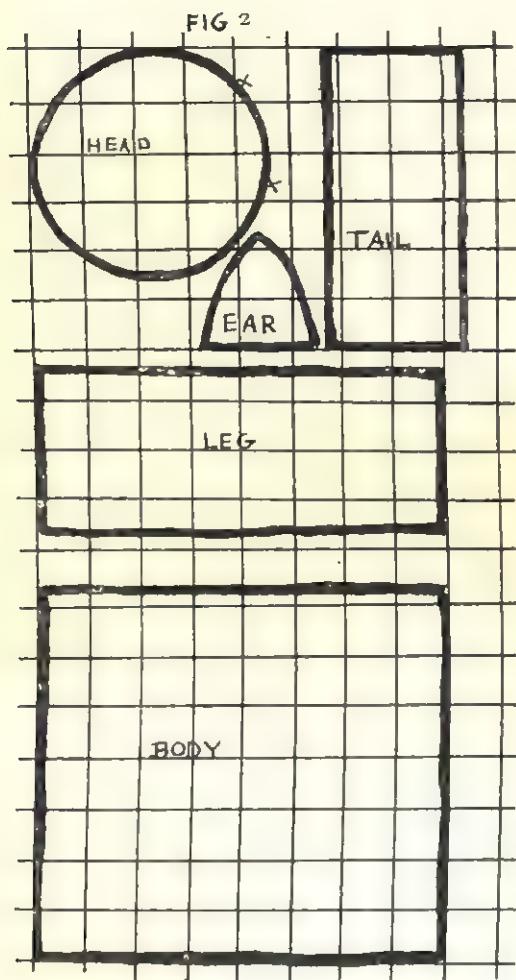


Billy Negro



Camel

FIG. I



I. Toys Made of Oval, Circular, and Tubular Shapes

These simple toys offer a great opportunity for originality in design to Seniors.

Attractive mascots for motors and dainty ornamental toys may be made in this simple way; felt and brightly-patterned prints are very suitable materials for these.

Perhaps the greatest demand is for toys suitable for babies and small children; these, besides being well designed and made, must be light, safe, and suitable for the child to handle. There should be no wires which might push through and scratch, or added eyes in the form of buttons or beads which might come unfastened and be swallowed, while cheap dyed materials, which are likely to run if made damp, should be avoided.

The most satisfactory of this type of toy for small children is that made of either white Turkey towelling or white ripple cloth and stuffed with kapok; the Turkey towelling toys will wash and dry quite successfully when soiled.

Peter Lamb

MATERIALS

$\frac{3}{4}$ yd. of white Turkey towelling.

Length of black mending wool.

Kapok to stuff.

Cost 8d.

Draw full-size pattern on paper from Fig. 2, lay pattern on wrong side of material and paint outline, the head double, tail and body single, the leg and ear four times. Cut out, allowing $\frac{1}{4}$ in. turnings. Stitch head, leaving opening between X's for stuffing; stitch body, legs, and tail, so that they form tubes (Fig. 3 A), flatten tubes and stitch rounded shape at the bottoms of legs and tail (Fig. 3B). Turn all parts right side out. Turn in edges and gather one end of body tube, draw in fairly tight and oversew across. This will be chest of lamb, and this gathered seam should be across chest (Fig. 4A), while long seam of tube should be underneath body. Stuff body firmly from other end, and gather and sew up as chest, but let the seam be upright this time, as this is the tail end of lamb (Fig. 4B). Stuff head, legs, and tail, and sew on

to body as dotted lines in Fig. 4 indicate. Both legs and tail have the tops turned in after they are stuffed, and are pressed out to form a circular shape where they connect with the body. The ears are stitched, turned out, and oversewn up (Fig. 5), then attached to head (Fig. 6). The mouth is marked in black wool (Fig. 7), and a vertical stitch in double black wool is made on the front of each hoof (Fig. 8).

A small brass bell attached by a ribbon around the neck of lamb adds to its interest, but if the toy is intended for a very small child it had better be left off.

Humpty Dumpty

MATERIALS

6 in. square of black felt.

6 in. square of emerald green felt.

9 in. square of white felt.

Small scrap of red felt.

Kapok to stuff.

Cost 1 od.

This toy makes a very good motor-car mascot; for a small car it may be reduced to three-quarters or half the size, as required. Make

pattern from Fig. 9. Cut out (no turnings should be allowed)—the head, double white felt; eight circles in white felt, for hands and feet; the half body in green, half in black (double); two arms and two legs in green (single) and in black (single); eyebrows and eyes in black, lips and nostrils in red (single).

Completed Humpty Dumpty

Place pattern on single head-piece, and trace position of features—hem them on.

Now oversew each part on right side, leaving openings between X's for stuffing. Stuff firmly and oversew parts together, making letters in Fig. 9 match, and placing colour as shown

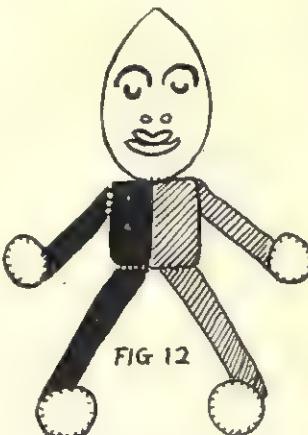


FIG 12

(Fig. 12): the diagonal shaded part shows the green and the arm, leg, and half body which is green on front should be black at back. A loop of white felt should be sewn at back of head to hang up mascot.

II. Silhouette Toys

This is another simple type of toy which may be very light and hygienic for small children, or it may be more elaborate as to design and material if required. Very interesting sets of toys could be made this way. For instance, a large silhouette of the Ark may be made of felt or cloth to form a sort of bag, and it could contain all kinds of animals made in this way. Another idea would be a large boot- or shoe-shaped bag which could contain the old woman and all her children.

These toys have no added parts, but consist of a well-drawn silhouette (with any thin part slightly thickened); this is cut out in double material, sewn, and stuffed.

Camel

MATERIALS

$\frac{1}{4}$ yd. of patterned print, 6 $\frac{3}{4}$ d. per yard, will make two camels.

Kapok to stuff.

Cost 3d.

Draw pattern from Fig. 10. Cut $\frac{1}{4}$ yd. of print in half so that it makes two rectangles 18 in. \times 9 in. Fold one rectangle in half to form a 9 in. square, lay pattern on this, and paint outline. Cut out, allowing $\frac{1}{4}$ in. turnings, and stitch. With all toys stitched on wrong side and turned out, there are two very important things to be done. At all sharp angles like that marked Y on Fig. 10, the margin must be snipped almost to the seam before turning out; and at all sharp points like that marked O on Fig. 10, the corners must be cut away. Fig. 11, A and B, should make this clear, the cuts being shown by checked lines.

Now turn camel right side out and stuff; then sew up opening. It will be noticed that certain parts of pattern (Fig. 10) are shown with a dotted line. These should be backstitched right through camel with a darning needle and strong

embroidery cotton. If the stitches are pulled tight it will give a quilted effect, which greatly improves the toy.

Billy Negro

MATERIALS

Pair of old brown wool stockings.

Some scraps of black, white, and red felt.

Piece of red and white checked gingham.

Some black cable rug wool.

Three tiny pearl buttons.

Kapok to stuff.

Cost 6d.

Dolls of all kinds are very successful (see Fig. 1) as silhouettes; elves, fairies, clowns, etc., can be made just with two thicknesses of felt cut without any turnings, oversewn on the right side, and stuffed. Billy Negro shows the silhouette doll slightly clothed.

Make pattern from Fig. 13. Cut 15 in. from tops of stockings, cut open at seams, and lay flat. Place on pattern and paint outline. Cut out in double material, allowing $\frac{1}{4}$ in. turnings. Tack together and stitch. Snip corners as Fig. 11, turn out, and stuff. The stocking will stretch, so that the doll will be larger than pattern. Stuff tight and sew up opening.

"Billy Negro" Pattern

The necks in these stocking dolls are inclined to be wobbly, so it is best to sew head down to body. Fig. 14A shows neck before being sewn, and Fig. 14B after.

Stab stitches are made in the places where the eyes, nose, and mouth are to go; these stitches are taken right through the head and

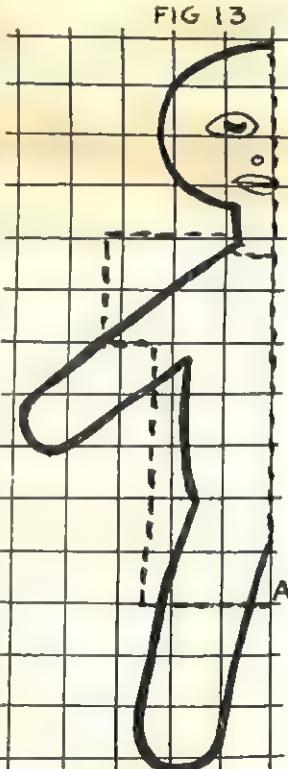




PLATE I
SOFT TOY MAKING

Humpty Dumpty
Brown and-White Cow

Eliza Jane, an Early Victorian Doll

Mr. Punch
Zebra

pulled tight to give a modelled effect to the face.

The whites of eyes are cut in white felt and the pupils in black; nostrils and lips in red. These are sewn in place over stab-stitches. The cable wool is untwisted, slightly combed out, and sewn in rows to form curly hair (this hides



FIG 14.



Neck and Hand of Doll

where stab-stitches for eyes, etc., have been taken through back of head).

Hands and feet are made by binding strong cotton about 1 in. from bottoms of arms and legs and finishing off securely. Fig. 14C shows cotton loose around arm, Fig. 14D shows effect of cotton bound tight and finished off invisibly.

The pattern of combination garment is shown in dotted lines on Fig. 13. It is simply made with French seam at sides, hem at arms and bottom, and band to fit tight at neck, pleat and three pearl-buttons in front. It is cut as a simple chemise or shirt and made into a combination garment by a small square of back-stitching at A (Fig. 13).

III. Animals Standing on 4 Legs

This is one of the most popular ways of making soft toys and is entirely different from the Peter Lamb toy previously described, for in that the legs were made separately and joined on. Now the main pattern is cut in two halves, each half having two legs continuous with the body. It is possible to get much more realistic animals in this way, but they need more skill in design and make than the simpler ones.

To design them, a good silhouette must be

drawn, the thin parts being slightly thickened. This, cut in double material, will be the main part of the animal. It is obtaining the pattern of the inside parts of the legs and under body, also the forehead piece, which requires the care, as the widths and shapes vary considerably with different types of animals, and can really only be adjusted by tacking and fitting in material.

These toys are not so often intended for very small children, so wire, glass eyes, and other accessories are often used in their construction. If required, they can be made in suitable material for small children; it is best, then, not to have them very large.

Zebra

MATERIALS

$\frac{1}{2}$ yd. of striped black and white print, either plain stripe or chevron stripe.

Small piece of black felt.

Small piece of orange felt.

Scrap of jade green and scrap of lemon yellow felt.

About 20 in. of strong galvanized iron wire.

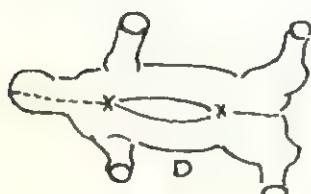
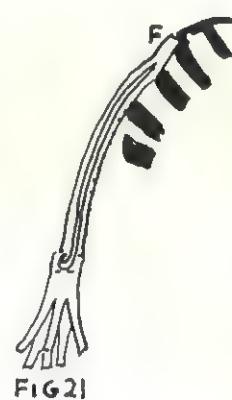
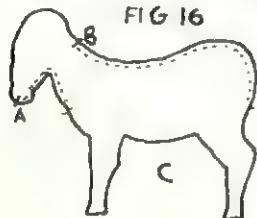
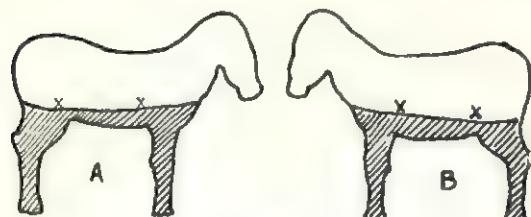
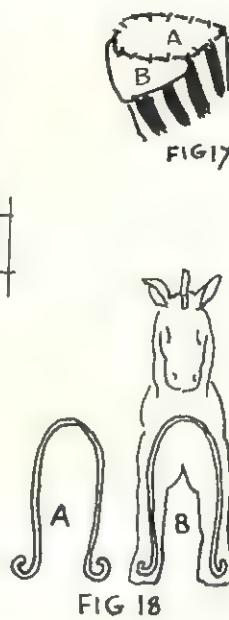
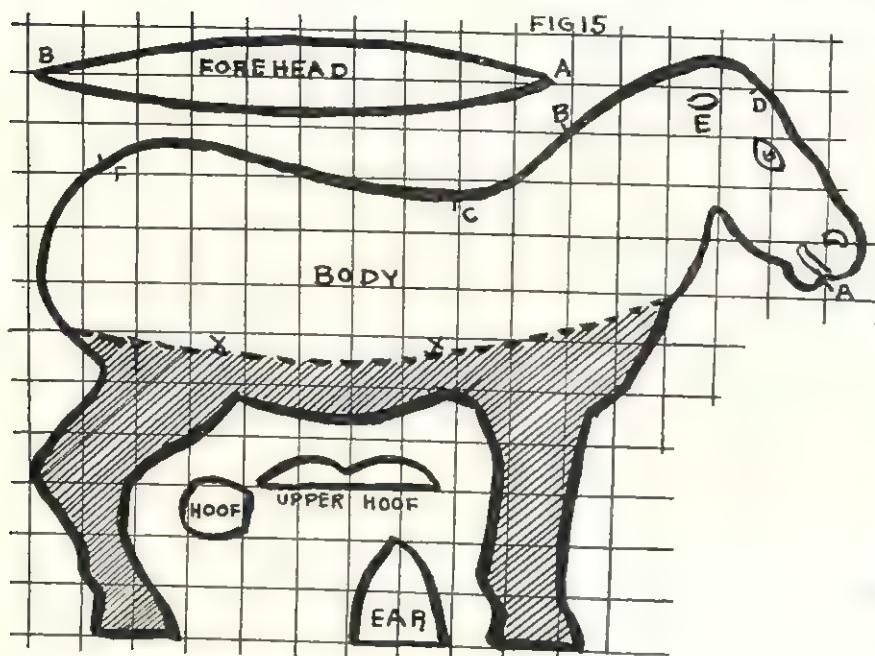
Cost rod. (See Colour Plate.)

Make full-size pattern from Fig. 15. Cut out each part shown, then make a tracing of the leg part (which is shaded in Fig. 15) up to dotted line. Cut this out and mark it *under legs*, so that your pattern will consist of six pieces—

1. Body.	4. Hoof.
2. Under legs.	5. Upper hoof.
3. Forehead.	6. Ear.

Cut out body and under legs in double material, forehead in single, hoofs in black felt, upper hoofs in orange, ears two black and two orange, as the ears are black felt lined with orange. Lay underlegs on body pieces, right side to right side, as shown in Fig. 16, A and B. Stitch on outline, then face two bodies together so that underlegs face each other on the inside. Stitch part above leg pieces, except opening for forehead as shown by stitches (Fig. 16C). Now stitch tops of two leg pieces together so that underneath part of zebra is joined up all but part between X's (Fig. 16D) for stuffing. Fit in forehead piece, making A and B match.

Pare edges and snip corners, then turn right



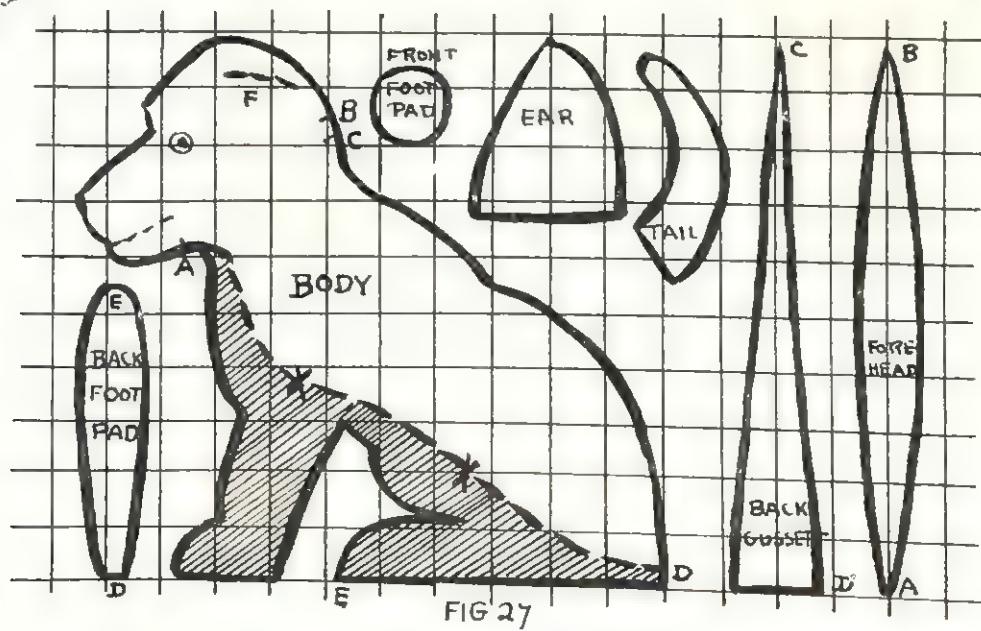
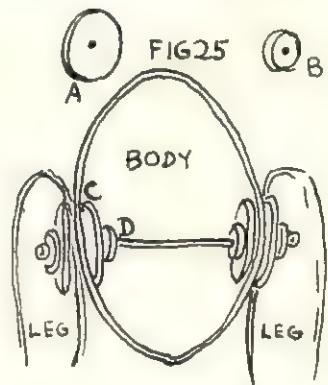
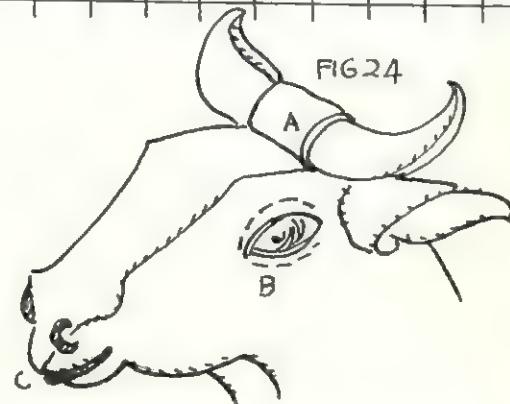
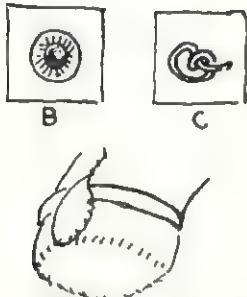
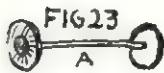
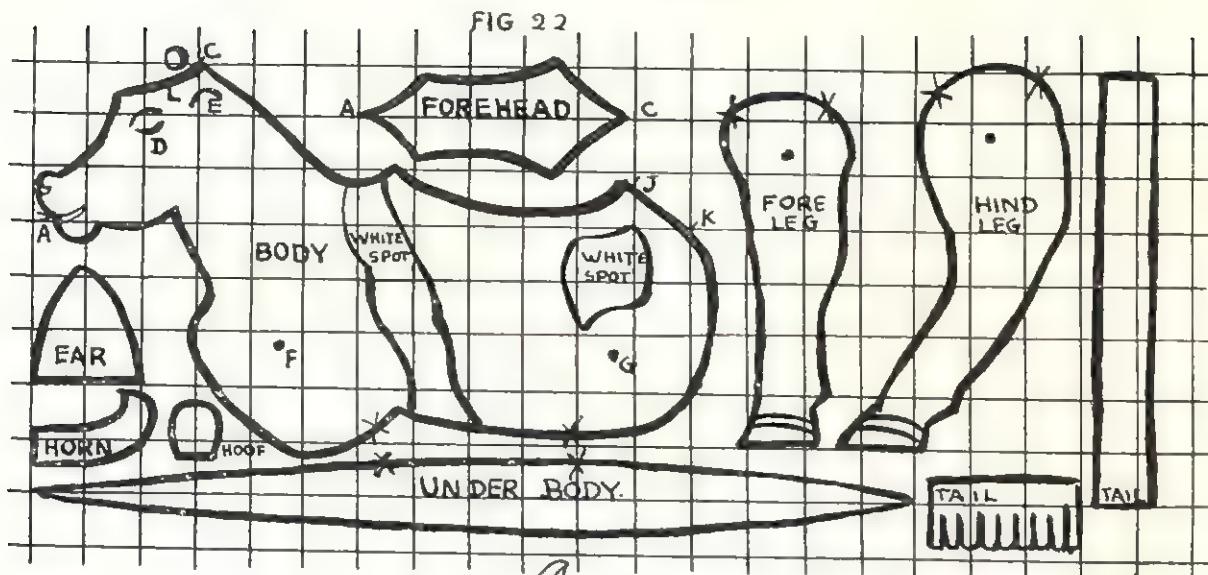
FIGS. 15-21

The Zebra

side out. Turn in edges of print and oversew bottoms of legs to black hoof-pieces on right side (Fig. 17A). Oversew upper hoofs in position; these go right around hoofs all but straight part at back (Fig. 17B). Cut two lengths of wire 11 in. long, bend as Fig. 18A, place in legs

as Fig. 18B, which shows position of wire as if zebra was transparent. One arch of wire should go into the two front legs and one into the back. Stuff zebra firmly with kapok, pushing the stuffing into the legs around wire.

THE MANE consists of three strips of felt: one



THE PRACTICAL SENIOR TEACHER

orange 8 in. \times 1½ in. tapering to ½ in. at each end, cut in slashes as shown in Fig. 19A; two black 8 in. \times ¾ in. cut as shown in Fig. 19B. The black strips are placed on each side of the orange and oversewn together; they are then sewn to top of head of zebra between points C and D on pattern. Fig. 20 shows portion of mane.

THE EARS. Oversew all around edge (each ear consisting of two pieces black outside, orange inside), attach to head at point E on pattern. Fig. 20 shows how ear should be curled into shape.

Cut oval for **EYE** in green felt, circle in yellow for nostril, and mouth in orange. Hem these in position as shown on pattern. Fig. 20 shows eye in place.

TAIL. Cut a strip of black felt 4 in. \times 2 in. and a piece of wire 4 in. long. Push one end of wire into zebra at F (Fig. 21). Roll felt around wire, hem firmly, and attach just above F, flattening at the point of attachment. Cut pieces of black and orange felt each 3 in. \times 2½ in. Roll them around the end of tail (orange inside black), and cut ends in a fringe. Fig 21 shows small portion of zebra with tail attached, drawn as if it were transparent to show wire.

The wire enables the tail to be bent up at a sprightly angle and adds a good deal of style to the zebra.

IV. Jointed Toys

By the use of metal or wooden disks, metal washers, and wire or cotter or split pins, the limbs of toys can be jointed. This gives quite a new character to a toy and opens a new field for design in toy making. Such toys as teddy bears, monkeys, dolls, and any four-legged animal can be made to take most amusing poses if the limbs and sometimes the heads are jointed.

The making of these jointed toys requires even more skill than the wired animals just described. A successful jointed toy *must* be very firm and hard as to stuffing, so wood wool (fine wood shavings) takes the place of kapok for stuffing. The outside material must be strong: felt or any of the specially made animal baizes are excellent; but it would be very difficult to

joint a toy made of Turkey towelling or print, and when made the joints would soon wear through the outer material.

Brown-and-White Cow

MATERIALS

½ yd. of brown felt.

½ yd. of white felt.

Small bit of black felt.

Eight metal washers.

Eight metal or wooden disks.

About 9 in. of galvanized iron wire.

Pair of large glass animal's eyes.

Wood wool to stuff.

Cost 2s.

(See Colour Plate.)

Make full-size pattern from Fig. 22. Cut out body, legs, and ears in double brown felt; tail, single; hoofs four times. Mark position of eyes, ears, mouth, nostril, and white patches on body. Cut out forehead and under-body in white felt, single; legs, ears, and white patches, double. *No turnings* should be allowed. Hem on white patches. Put in eyes while body is flat; in this way—

The eyes are supplied attached to each end of a wire; separate the eyes and shorten wire to about 1 in. behind each eye, cut two pieces of felt each about 1 in. square, push the wires through the centre of these, and curl wire tight at the back of eye. Fig. 23A shows eyes before separating; B, front view of eye pushed through patch; C, back of eye with wire curled tight to keep eye in position. Cut aperture as shown on pattern at D; hem patch at back of aperture so that eye shows through; stitch eyelids above and below eye on surface felt through patch (Fig. 24B). Make ears and attach at E on pattern just as for zebra.

Oversew cow together on the right side and fit in forehead and under-body. Letter A of under-body should just meet letter A of forehead. Leave opening between X's for stuffing. Now cut two lengths of wire each 6 in. long, pass these right through the body at letters F and G on pattern, placing on each side of each wire a wooden disk and a metal washer in such a position that the wooden disk comes next the felt and leaves the wire projecting to about

2 in. on each side of cow ready for legs to be attached. Fig. 25A shows wooden disk, *B* metal washer, *C* and *D* the disk and washer in position in a sectional drawing of cow. Now stuff tight and sew up opening.

Make legs, each consisting of brown felt outside, white underneath; sew on brown under-hoofs and strip of white as shown on pattern and oval of black to show cloven hoof in front (Fig. 26). Mark position of *F* and *G* from pattern on under-side of legs. Stuff tight, but before finishing stuffing and sewing up pass wires which have been left projecting from cow through points *F* and *G*; put on a wooden disk and a metal washer to each leg, twist wire into a tight curl so that legs are firm and close against body. Finish stuffing and sew up. The section through cow (Fig. 25) should make position of wire disks and washers quite clear.

Make tail into a roll, hem up, roll fringed piece and attach to bottom of tail, attach tail at *J*, and hem down with tube flattened to *K*. Make horns and stuff; make a roll of felt about $1\frac{1}{4}$ in. long, attach to base of horns, and fix horns in position as shown at *L* on pattern and Fig. 24A. Hem on nostrils and mouth as shown in pattern and Fig. 24, *C*.

V. Sitting-Down Animals

This is a type that an amateur toy maker generally finds difficult to understand, but in some ways they are simpler in construction than the two types last described. The pattern is obtained in almost the same way as that for the zebra: the silhouette has to be drawn of the animal sitting down instead of standing. The under-legs are cut much as those for the standing animal. Forehead and other accessories are just the same, but these toys are generally improved by having a long gusset inserted at the back.

Sitting toys may have the front legs stiffened with an arch of wire as in the zebra, or they may have rolls of paper to stiffen the legs and pleats to keep the legs close to the body.

Rover the Pup

MATERIALS

- $\frac{3}{4}$ yd. of fawn ripple cloth.
- $\frac{1}{4}$ yd. of white ripple cloth.

Some stiff brown paper.
Some black embroidery cotton.
Two small button moulds.
Cost 2s. 4d.
(See Fig. 1.)

Make a full-size pattern from Fig. 27. Make a tracing of part below dotted line, which is shaded, and this will be the pattern of the under-legs and under-body. The pattern should consist of eight pieces—

1. Body.	5. Ear.
2. Under-legs.	6. Tail.
3. Back gusset.	7. Foot-pad (back).
4. Forehead.	8. Foot-pad (front).

Cut out body, tail, front and back foot-pads, and ears in double material, back gusset, single, fawn colour. Under-body and ears are double white material, forehead single ($\frac{1}{4}$ in. turnings). Place under-legs on body, right side to right side. Stitch on wrong side. Fig. 28, *A* and *B*, shows two sides of dog facing and under-legs stitched. Now face pieces *A* and *B* together so that under-legs touch, and fit in forehead piece and back gusset, so that letters *AB* on forehead meet *AB* on body, and *CD* on back gusset meet *CD* on body. Fig. 29B shows position of back gusset.

Now join under-body all but openings between X's for stuffing. Turn right side out. The dog should look like Fig. 29. Stuff body firmly with kapok, but before stuffing the legs cut two pieces of paper 10 in. by 3 in. as Fig. 30A; roll up and stick with gloy, and push out fringed end (Fig. 30B). Push these paper supports into the tops of the legs, keeping the fringed part upward; stuff around them firmly, finish stuffing the animal, and sew up.

It will be found that the legs of dog are inclined to stick out in an ugly fashion, so four pleats must be sewn, each between a leg and the body, to keep the legs vertical and close to the body.

Stitch ears and tail on wrong side and turn right side out. The ears are fawn with white linings. Oversew openings at the top of ears and sew in position at *F* on pattern, sewing underneath so that ear will fall over (Fig. 30C). Cut a triangle of black material and hem on for nose. Work marking for mouth as shown in

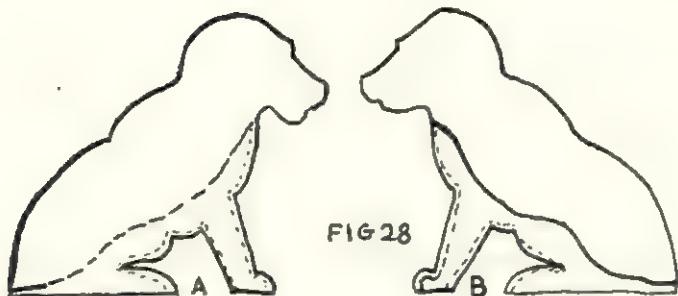


FIG 28



FIG 30 C

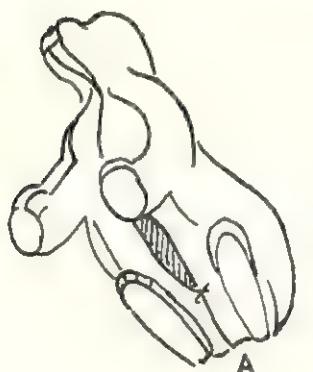


FIG 29

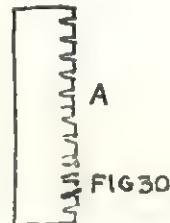
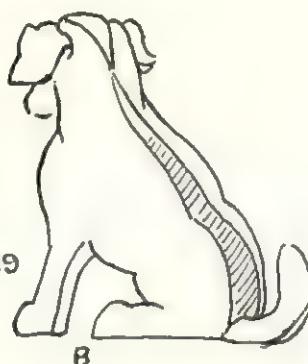


FIG 30



Fig. 30C. Sew in button moulds for eyes with four stitches taken right through head and paint with black ink as shown in Fig. 30C.

VI. The Puppet Show

This is a side of Soft Toy Making which should appeal very strongly to teachers and pupils in Senior Schools. If the idea were started in a school very simply at first, perhaps by making the characters in a well-known fairy story, which might be acted by Seniors for the entertainment of children in an Infant School, gradually more elaborate ideas could be worked out until the study of History, Literature, and other subjects could be greatly assisted by the making and working of puppet shows.

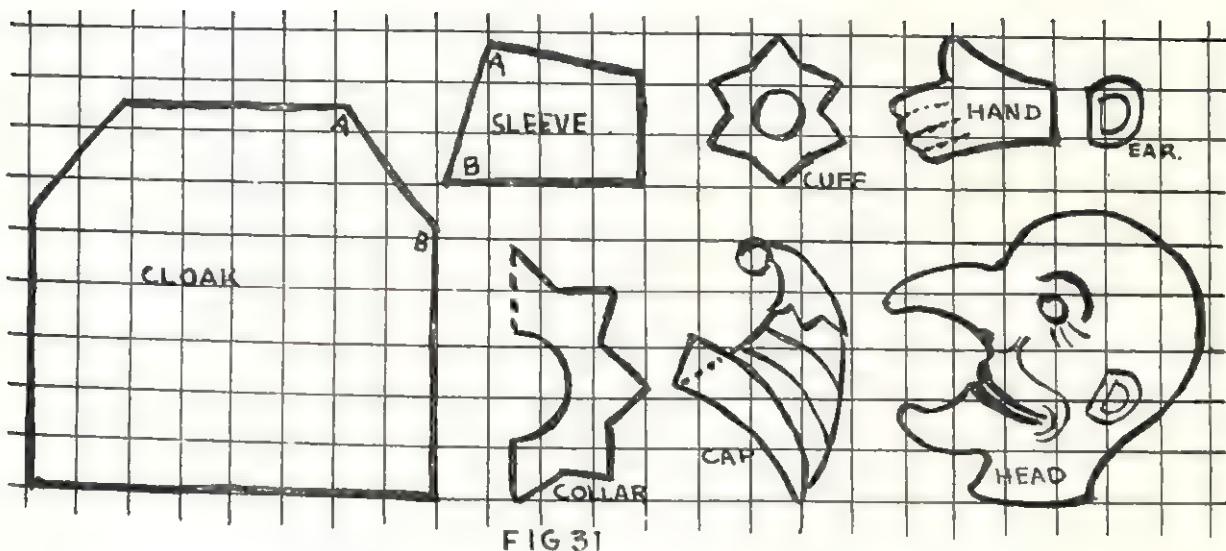
The simplest way to work the show is to have a table draped with a cloth which reaches the ground. The table is placed just far enough from a wall for the worker or workers to hide behind it, and the puppets appear just above the table. If a sort of picture frame of ply-wood can be attached to the table it greatly improves the appearance of the show (Fig. 32).

Mr. Punch

MATERIALS

- 9 in. square of white felt.
- Small piece of royal blue felt.
- Small piece of lemon-yellow felt.
- Small piece of scarlet felt.
- Scrap of black felt.
- $\frac{1}{4}$ yd. of yellow and white striped print.
- Brown embroidery cotton.
- Two fingers of an old glove.
- Pair of large glass animal's eyes.
- Seven large red wooden beads.
- A post card.
- Kapok to stuff.
- Cost 1 od.
- (See Colour Plate.)

Make full-size pattern from Fig. 31. Cut out head and hands in double white felt, ears four thicknesses. Collar and main part of cap in blue, cuffs in red, brim of cap and $\frac{1}{8}$ in. strips for decoration in yellow, cloak and sleeves in striped print. Only half of sleeve is shown on pattern, so material must be folded double and fold placed at bottom. Place pattern on each



piece of head and carefully mark the position of all features. Put in eye as in Rover the Pup, but this time cut strips of felt and hem on to form lids (Fig. 33). Hem on black eyebrows, red lips, and red nostrils. Mark creases in face with embroidery cotton in any outline stitch. Oversew each ear, slightly stuff, work inner markings, and sew in position. Oversew all round profile of head; leave neck open.

Form post card into a tubular shape just large enough for second finger of normal-size hand (Fig. 34A). Sew or stick in position. Stuff head, and when partly stuffed push tube made by post card up in the centre; stuff firmly around and sew cardboard to neck of puppet (Fig. 34B). Oversew hands all but wrists. Stuff fingers and backstitch between fingers, taking needle right through hand and pulling tight to give a quilted effect. Stuff rest of hand and put glove fingers one on your thumb and the other on your fourth finger. Dip these into gloy or any other sticking substance, push them into hands; now withdraw the finger and thumb without taking out the glove fingers; let them dry and oversew glove fingers to wrists of hands.

Make cloak, putting in sleeves as indicated by *A* and *B* on pattern. Gather neck of cloak to neck of puppet and sew firmly, also wrists of sleeves to wrists of hands; sew on collar and cuffs; the collar should have an $\frac{1}{8}$ in. band of yellow felt stitched to the edge. Sew seven

beads down front of cloak to look like buttons. The bottom of cloak should be trimmed with a $\frac{3}{8}$ in. band of blue felt cut in points. Make cap as shown in pattern and Colour Plate. Sew on firmly. Fig. 35 shows the positions that operator's hand and fingers take in puppet to work it successfully.

VII. Dolls

Dolls are the most fascinating of all soft toys to make. They may be of three distinct types.

1. On the lines of the Peter Lamb toy of this chapter, that is with body, arms, and legs formed of tubular shapes of different sizes and a ball for the head.

2. As silhouettes, like Billy Negro, simply two flat pieces cut the shape of the silhouette and no added limbs.

3. Or like the doll presently to be described, with shaped body and limbs.

In all cases it is best to accept the limitations of the craft and not to make the doll too naturalistic. The quaint painted or worked faces and limbs, which are rather long, straight, and floppy, are among the characteristic charms of the soft toy; and, although modelled masks can be obtained, which may be attached to the soft doll's head instead of the painted or worked features, it is doubtful whether they are an improvement.

The materials for doll making may be very

THE PRACTICAL SENIOR TEACHER

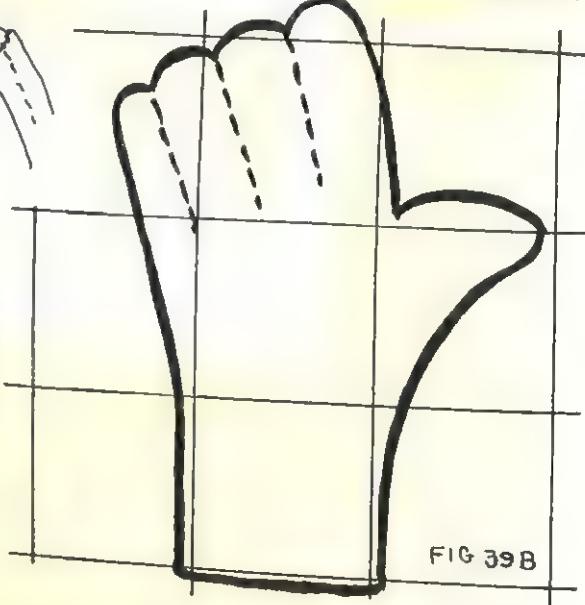
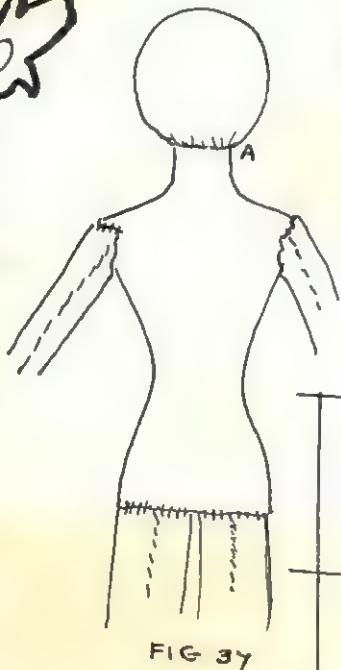
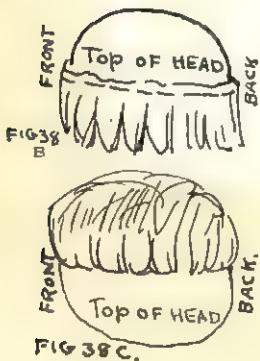
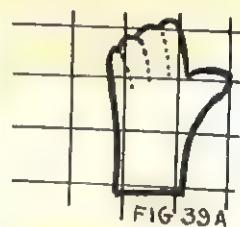
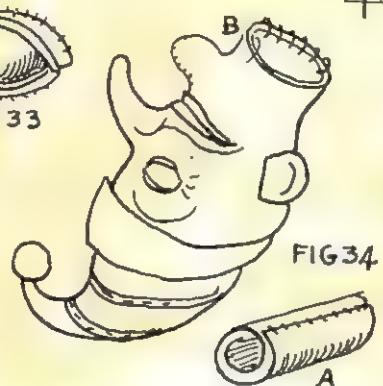
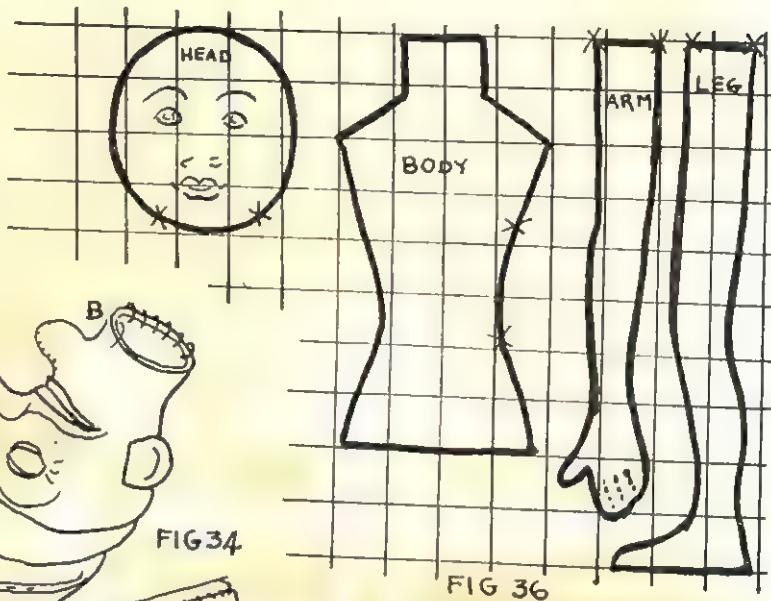
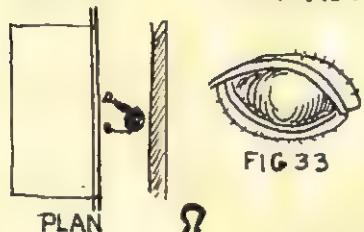
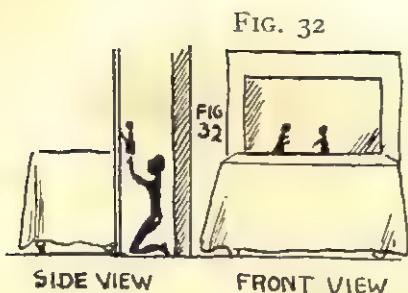




PLATE II
SOFT TOY MAKING

Arrabella
Donkey

(727) D

Colliwog and Suzanne
Duck

Belinda
Camel

188

simple. A flesh-coloured underclothing material is best for the ordinary type—that known as "Spava" is very good.

Felt, velvet, old stockings, and other materials may be used for different types. Sheep's wool makes excellent fair and brown hair. It must be thoroughly washed and may be dyed with Batik dye. Cable rug wool unravelled and combed or sewn on in curls makes good black hair. Clark's stranded cotton makes good straight hair, but it takes a lot. Artificial silk of the kind used for knitting jumpers may also be used.

Eliza Jane, an Early Victorian Girl Doll

MATERIALS

$\frac{1}{4}$ yd. of flesh-coloured Spava or fuji.
Some sheep's wool.
Orange batik dye.
Kapok to stuff.

Clothing

$\frac{1}{2}$ yd. of patterned artificial silk taffeta.
1 yd. of yellow organdie frilled material.
3 yd. of yellow baby ribbon.
 $\frac{1}{2}$ yd. of black baby ribbon.
 $\frac{1}{2}$ yd. of green ribbon, $\frac{1}{2}$ in. wide
Spray of flowers.
Piece of milliners' buckram.
Bit of black felt.
Bit of black lace.
(See Colour Plate I.)

Cost 4s.

Make full-size pattern from Fig. 36. Cut out two arms and two legs in double material, and head and body double. Trace features on head-piece. Stitch on wrong side, leaving openings between X's for stuffing, pare edges, and turn right side out. Stuff body and sew up. Stuff arms and legs and sew on: Fig. 37 shows legs with position of seams centre front and back, and arms flattened with seams at front and back. Stuff head and ease and oversew it to neck (Fig. 37A). Paint features. It is best to outline eyelids, lashes, brows, etc., in dark brown; lips bright red, and eyes a decided blue or brown; rosy cheeks may be added, but must be very delicate in colour and gradually deepened.

For the hair, prepare the sheep's wool by washing it in Lux and dyeing it with orange batik, thoroughly dry and comb it; sew it on in three stages—first a layer all around lower part of head (Fig. 38A), then a piece sewn to middle of top of head (Fig. 38B) and turned back over stitches to cover top and side of head (Fig. 38C), then another piece sewn in the same way as Fig. 38B to cover other half of top of head; the two pieces rise from centre stitches so that the hair seems to be parted in the centre and falling naturally on each side of face. The ringlets shown in Colour Plate are made by curling hair around a hot knitting needle.

The methods of making doll's garments are not described, as they are just as for any ordinary doll. The following is a list and description of the clothing—

Ankle knickers of frilled organdie.

A frilled organdie *petticoat*.

Taffeta dress with tight bodice and puffed sleeves, bottom of dress bound with ribbon and trimmed with bows and festoons of ribbon

Coal-scuttle bonnet made of buckram, covered with taffeta, trimmed with flowers, tied under chin with ribbon.

Black lace mittens.

Black felt slippers kept in place with crossed bands of black ribbon.

VIII. Additional Projects

Colour Plate II shows seven other soft toys which can be made on the lines of those already described. A short description will be given of the materials and methods for each of these toys, and it will be found a good exercise if, after making some of the toys already described, the worker will now try making her own patterns of some of the toys on Colour Plate II, and carrying them out, perhaps introducing her own ideas, such as change of material, style of clothing, etc.

ARRABELLA (DOLL ON LEFT OF COLOUR PLATE II)

Arrabella is made exactly as the Early Victorian doll already described; she is slightly larger, and her features, instead of being painted,

are worked in a backstitch outline with black and red stranded cotton. Her clothing is a suit made of patterned artificial silk, and consists of trousers, cut baggy at the hips and tight at the ankles, and a jumper with a flared frill around the waist. Bottom of jumper and trousers are bound with black ribbon. She has a wide velvet waistband, and frills (at the neck and wrist) of double spotted muslin. Her black velvet shoes have pompons on the toes made of yellow Star Sylko. Her hair is sheep's wool dyed a golden colour.

GOLLIWOG

The pattern of Golliwog is cut in the same way as that of Arrabella, except that the head is all in one piece with the body as shown in pattern of Billy Negro in the early part of this chapter. Golliwog is made of black sateen. A linen button and a boot button make each of his eyes; red and white stranded cotton is used for his lips and teeth; and he has a rather large nose, which is stuffed and sewn on. He wears striped satin trousers, a gaily patterned silk waistcoat, and a black velvet tailed coat, a gentleman's worn-out collar nicely laundered cuts up to make his collar, shirt front, and cuffs. His hair is a piece of black fur and he has black suède shoes.

SUZANNE

This doll, who sits on Golliwog's knee, is 23 in. long. The pattern is as that of Arrabella but with smaller head, longer legs, and very slender, pointed feet. Hair of white sheep's wool is arranged in a long bob, with a band of black ribbon. Suzanne wears white silk knickers and a pierrette's dress, with tight black satin bodice,

pale green organdie frills, four for the skirt and three for the neck, picot edged with black. She wears black ribbon bows at the wrists, and her black satin shoes are kept on with crossed black ribbons up the legs. She has a painted, doll-like face with blue eyes.

BELINDA (DOLL ON RIGHT OF COLOUR PLATE)

Belinda is made on the same lines as the other three dolls, but is considerably larger and very slender. She has white hair, which is parted in the middle and rolled up at the back, and a painted face. She wears yellow organdie under-clothing, a dress of frilled net (pale blue), a blue velvet coat edged with white fur, a pearl necklace, and black felt shoes with high heels formed of rolls of felt.

DONKEY

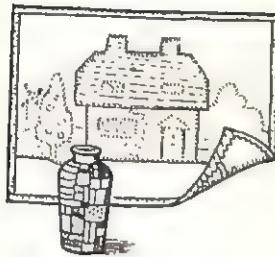
This is made of grey and black felt, with trappings of orange and yellow felt.

CAMEL

For this use fawn felt with blue and rose felt trappings. Both these animals are made and wired exactly as the Zebra already described, the only difference being in the drawing of the pattern and in the fact that they are stuffed with wood wool instead of kapok.

DUCK

This is made of patterned print, with feet and beak of orange felt, and glass eyes. The pattern is formed from a simple silhouette of a duck, with added piece running down front and under body to give width. Wings, slightly stuffed, are also added.



RUG MAKING AND THRIFT CRAFTS



RUG MAKING

RUGS must have been first used as a covering. Somebody must have been cold, and the skin of an animal was thrown over his or her body: thus the rug was born. The second form of rugs may have been reeds woven or plaited together; and then, as coarse woollen and flax and hemp materials were woven, so rugs in these mediums were made. They are a long way from the wonderfully hand-made rugs of to-day, but without the former the latter could not have been made.

As time progressed, rugs were found to be comforting to the feet: they kept draughts away from them in homes where draughts were over common, and so it came to pass that to talk about rugs meant something that covered the floor.

A Nursery Rug

As mentioned above, the first rug made of material must have been a very coarse and ugly affair. But a modern rug can be made of material and yet be extremely pretty. For the example here a nursery rug has been chosen, though of course any kind of cretonne or a thicker material can be used for the top, and a single piece of cloth or similar fabric for the back.

A VERY IMPORTANT NOTE

Before we continue with a description of

the nursery rug, it must be emphasized that the secret of a long life for a material rug is the way it is lined. Two or three thicknesses of hessian between the front and the back will give ten times more life to a rug than one thickness. This remark does not apply to skin and heavier rugs, though these, in most instances, are better for a backing of some kind.

HOW TO MAKE THE RUG

First of all decide on the size of your rug, and hem a piece of hessian all round to this size. Take two or more pieces of hessian and tack these on to the hessian ground, then on one side put a piece of cretonne, and on the other a piece of cloth or flannel. Bind all round, and the rug is completed.

VARIATIONS ON THE ABOVE

Supposing the piece of cretonne is not large enough to cover the hessian, and you do not want to cut the hessian, a border, top and bottom, on to the cretonne will not look ugly, and in most cases will look most charming. Both pieces of material need not be the same width, which is an advantage, should the material be unevenly cut. These pieces should be sewn on to the cretonne, both on the wrong side, before they are tacked on to the interlining.

With regard to the reverse of the rug, should

one have several pieces of cloth or a similar material in the house, these will save the expense of buying a length for the back. The pieces should all be cut the same size, and tacked on to the interlining before the front is so sewn. Each piece should just touch the other. Then over the joins ribbon or braid should be sewn,

Cretonne rugs can be made large or small, and other variations will come to the worker's mind, based on the few hints given above.

Appliquéd Rugs

From cretonne rugs our thoughts can easily be diverted to appliquéd rugs. These are made in a similar way to cretonne rugs, but are much more fascinating to make. To a Senior pupil with imagination, they will be a great joy. The rug illustrated in the Colour Plate facing p. 208 shows a farmhouse with its outhouses, and, although the outhouses in this instance were cut from a nursery cretonne, one can easily make such outhouses for oneself. A ground of hessian is required, and a large piece of blue cloth, case-mant cloth, or linen for the sky. This is placed on the hessian, and should occupy more than three-quarters of it. At the bottom of the blue cloth is placed a piece of green material for the grass. Now the house is built up "against the sky."

In the example the house is in the middle of

the canvas, and is made of stone-coloured case-mant cloth; the roof is next put on and is made from checked silky material. Do not forget to put in the chimney-pots (these can be cut in with the roof) and to slope the roof top. When house and roof are tacked in place they should be buttonholed to keep firm. Now put in the windows, which are made of pieces of lace over dark-coloured material (to represent the



FIG. I
Nursery Rug in Cretonne

Note the plain piece top and bottom, showing how to make the rug larger if the cretonne is not sufficient.

very securely, so that the cloth cannot come unsewn. When this is completed the rest of the interlinings and the front are added. An odd piece of ribbon with a vandyke was used for the example shown, and this looks very attractive along the edge. If you do not want to go to the expense of buying a vandyked ribbon, it can be made from a non-fraying material, and would answer the same purpose (Fig. 1 and Fig. 2).

interior of the room). These should be button-holed very closely into place, one or more in the roof, two on one side of the door, or the door between them—a matter for individual taste. The door should be made of dark-coloured material, and it should have a little gable over the top. Do not forget to put in with cotton a knocker and letter-box.

For the garden, cut out flowers from any cretonne, see that they suit the picture, and sew into place—the small flowers only require a few stitches to keep them from "riding" up, but the larger ones, and trees, should be button-holed. A quarter of a yard of nursery cretonne was bought for the rug illustrated, and from this were cut the farmyard scenes, which were appliquéd on to the rug. If you do not want to go to this expense, people are usually willing to give you scraps of cretonne, and there is always some little object one can cut from such cretonne—an animal, a house, a bunch of flowers, etc. Pictures need not all be houses; quite a good idea would be for each pupil to make a picture out of any scraps she has by her, making bowls of flowers, woodland scenes, etc. The canvas should of course be large enough for a rug, but what this size should be is left to the individual pupil or teacher. Rugs are padded and lined as for the previous one, and bound securely all round.

String Rugs Made with a Needle

This is very coarse work, and is eminently suited to pupils who are rather clumsy with their fingers. It will give them encouragement, when they have completed such a mat, to do something finer, and they will gain confidence that their "fingers are not all thumbs." Of course the rugs can be made in finer string, and the strands placed closer together, but this rug was designed specifically for the encouragement of the pupil who is none too sure of herself.

To MAKE. Cut a piece of medium-holed ordinary Penelope canvas to the size required, and turn in the edges. Choose two colours of string (this can be obtained in many colours at the cost of threepence or sixpence a ball) and work alternate colours in long stitch, six squares of the canvas to a stitch. (Use a large blunt

canvas needle or a bodkin.) Continue doing this for a border of 3 in., five rows, then fill in the centre with a row of one colour followed by a row of the other colour until the canvas is entirely covered; or, as in the illustration, a variation of two rows of one colour near the middle can be introduced. All kinds of combinations will come to the worker's mind, and

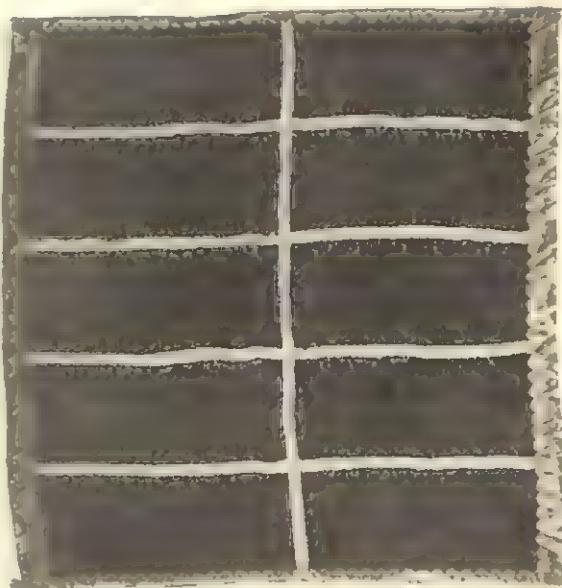


FIG. 2

Reverse of Nursery Rug

Oblongs of cloth have been sewn together, the seams covered with braid. Note the vandyked ribbon along edges.

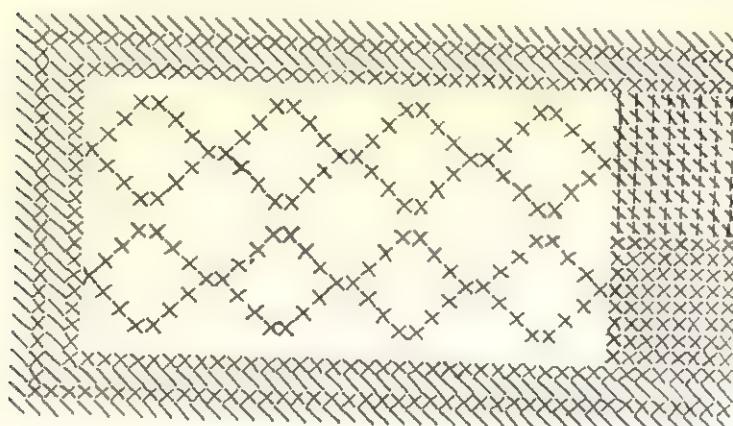
this idea gives the individual a great scope to show what she can do. As many colours as wished can be introduced into the rug, and this again must be left to the worker's taste. (See rug in the middle of top row in colour plate.)

To FINISH

Oversew edges in whichever string you have the most of, interline rug well, and line with a matching or contrasting material. This latter should be washable, as then the rug can be frequently so cleaned. Such a mat is very inexpensive and will do excellently for a bathroom or kitchen.

Crochet-Hook Rugs

While we are dealing with Penelope canvas, it would be as well to mention that pile rugs similar to those made by the rug-hook method (p. 197) can be made with a crochet hook. Patterns can be copied as they are, in this or the cross-stitch method (p. 195), or a very easy, but charming, effect can be obtained by using all kinds of scraps of wool in all colours. This will appeal to the economy lover, and the result is like one of those fascinating baby's balls of all colours.



To MAKE

A piece of Penelope canvas is needed, the required size, and as many scraps of wool as one can find. A wooden gauge (the one used for the hook method will do) and an ordinary steel crochet hook are also used.

Tack the canvas all round to prevent fraying, and start at one end to fill in the holes. Mix the colours as much as ever you can. Each strand should be the same length by the gauge, and a loop is made with the hook over the dividing strands of the canvas, similar to the way one makes a fringe. This method is continued until the canvas is all covered over. It will probably be thick enough without an interlining, but there should be a lining of some kind which is stitched on to the edge of the filled-in canvas. If you are making a pattern, copy the pattern first, then fill in the ground. If one makes a mistake, it is easier to rectify it in this way, or if one does not want to unpick, one can probably work the ground in so that an alteration is

not necessary. (See Colour Plate, top left-hand rug.)

Patterns

There is nothing so tedious as to alter anything when you discover a mistake has been made and the work is almost completed! Unless the work has to be an absolute copy, or there are two sides which must be exact, it is almost always possible to put an extra stitch here and there, and thus save a lot of time unpicking. You may know a mistake has been made, but,

FIG. 3

Half of Pattern for Rag Rug

Enlarge as required.

✗ = Fawn border and 3rd row.

✗ = Black block.

✗ = Cerise and black in border and diamonds, but cerise only in middle block. Ground is pale pink and cream. Pattern can be used for cross-stitch and hook rugs.

unless it is very palpable, the onlooker will not. This is not meant to advocate slovenly or "anything-will-do" work. One should do a thing as perfectly as one can: but mistakes will happen, and it is sometimes wise to suggest how they can be put right without too much annoyance and discouragement for the pupil. In the pattern on the left-hand side of the cross-stitch rug mistakes have purposely been made: see if you can find how it differs from the right-hand side. The errors are not noticeable unless searched for, and do not look ugly.

A Thrift Rug

This can be made on any kind of canvas, but the real rug canvas is the best medium. All kinds of rags can be used, but the rug illustrated is made from scraps of artificial silk, by cutting into strips old petticoats, knickers, stockings, etc., in this material. These are cut into strips more or less the same width, and are cut into the right length by the aid of the wooden

gauge. The rug can be made with a crochet hook, but a rug hook is better. The method is the same as that for the crochet-hook rug if a crochet hook is used; if it is made with a rug hook, whatever kind of hook is used, this is employed as for rug wool. If you have several

lining of hessian or similar material, but requires no interlining. Such a rug washes well, costs nothing, and can be quite pretty. Any piece of silk too long can be trimmed with scissors, but in such a shaggy rug one need not be mathematically correct as to the length of each strand.

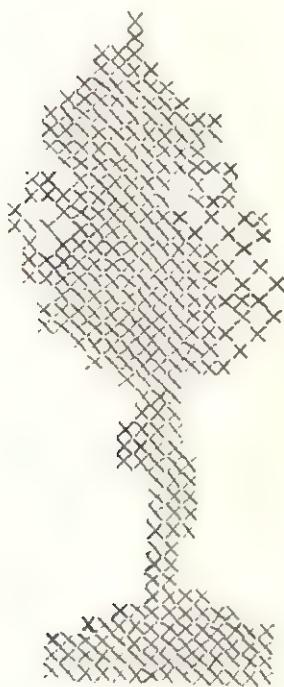


FIG. 4

*Details of Right-hand Tree
in Cross-Stitch Rug*

colours, patterns can be made; for this purpose an easy chart (Fig. 3) is given. The Colour Plate shows that black, cerise, pale pink, fawn, and cream artificial silk strips were used. The chart indicates colours of stitches. The pattern is an easy one; as many rows of diamonds and blocks can be added as wished. Care must be exercised in copying all patterns of this description, that the counting of the stitches correspond with the holes in the canvas and *vice versa*. Discrepancies in the counting will show in the completed article, but the strands of artificial silk are easy to undo, so a pattern that is to be perfectly correct is just the thing for this kind of rug. (See Colour Plate, p. 208, top right-hand rug.)

When completed, the rug should have a

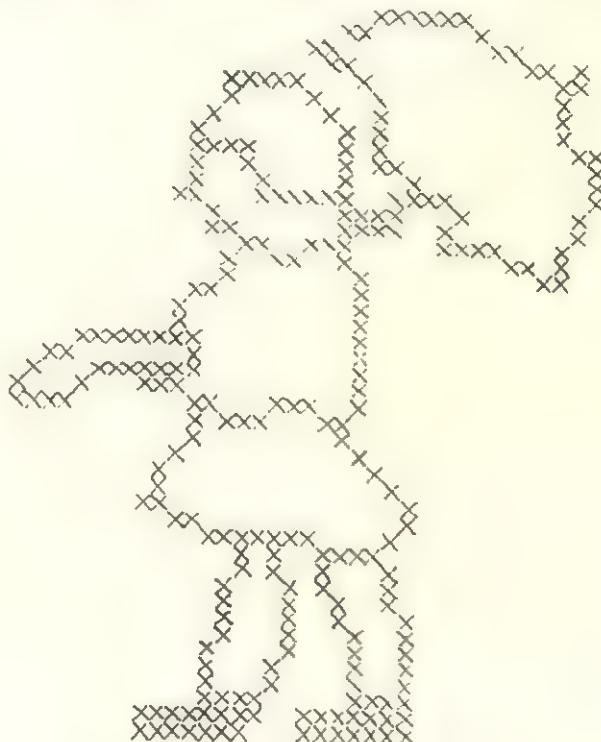


FIG. 5

Outline of Figure in Cross-Stitch Rug

BEST MATERIALS TO USE

Artificial silk takes the first place. For light wear, ninon, voiles, and like materials can be used: fabrics with a silky finish, such as printed and plain delaines, make quite good rugs. The different materials should not be mixed, as the pile will be uneven if they are. Cloth and stiffer materials should not be used—indeed the worker will find out for herself that, unless cut very narrow, they cannot be, since they will not pull through the holes.

Cross-Stitch Rugs

These are, in the writer's opinion, the most charming of all hand-made rugs. They can be

made in a variety of ways, the most popular being simple cross-stitch on rug canvas. The example in the Colour Plate was worked on a yard of rug canvas, 18 in. wide, and worked in scraps of wool from the wool box. Not a single ball of wool was specially bought, and

and a thinner one may require eight. The bodkin, however, will easily take these, and, so long as the hole is filled up, it does not matter how many strands are used: this is the beauty of doing a cross-stitch rug in this manner—all odd scraps of wool can be used up, since the strands

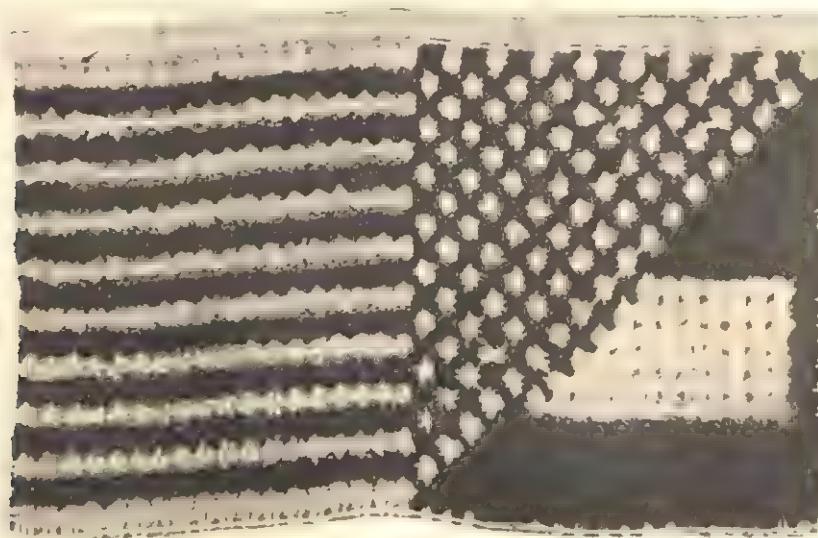


FIG. 6
A Double and Single Cross-Stitch Rug
Both types of cross-stitch are used, on rug canvas.

any girl can make a similar rug by begging strands of wool from this friend and that.

TO MAKE

First of all turn in the ends of the canvas, each 1 in.; this will make the rug 34 in. long. Take the wool of which you have most, and thread a bodkin with four strands. Cross-stitch over the two ends first of all, as this will prevent fraying, and this canvas will very easily fray. Use this wool of which you have the most for the border: sides and lengths should match respectively, but the length and sides need not; indeed, so long as a certain harmony is maintained, not even these need match.

Ordinary wool will require four strands to be used to cover over the strand of the canvas and to fill in the holes. Some wools which are thinner, yet four-ply, will require six strands,

need not be all of the same colour, four strands, each of a different colour, giving a charming motley effect (see Colour Plate).

EXPLANATION OF COLOUR SCHEME

Fig. 4 gives the chart of the right-hand tree on the rug. This differs a little from the left-hand one, for reasons already explained: the left-hand tree is purposely made different, so that, should a worker put in a wrong stitch, it can in most instances be left. The trees are worked in all kinds of green wool, mostly four or six strands to a bodkinful. The little girl (Fig. 5) is naturally very crude, as such large figures must be; she is made in various coloured wools, four strands to a bodkin; the umbrella is made of two different shades of blues and two different shades of mauve, thus having a charming speckled effect. The rest of the mat is filled

in with a border of crosses, three stitches deep, each set of crosses being separated by a dark straight line of some kind. The ground between the crosses is filled in with fawn or grey. The colours of crosses have some semblance of uniformity, i.e. they are the same more or less at the ends, but when the middle is reached the colours are not so matching. This gives the rug a nice "homely" look, as if the work has not been too laboured, and besides, since the rug is made of all kinds of wool, it is pocket-saving too.

Further explanation of the rug does not seem necessary. If a worker does not like the way the pattern and the crosses are arranged, she can use these as a basis for her own ideas. A rug of all crosses and dark lines may appeal to one worker: in this she must, however, take care that the canvas is of such a size that the holes can be divided by four all round. The figure alone in the middle of a plain ground may please another worker, while trees alone are sure to appeal to someone.

If wool has to be bought, 2 oz. of a thick four-ply, four strands to the bodkin at a time, will just complete the outside row of a 34 in. \times 18 in. rug. From this it can be calculated how much is required for a whole rug. Always allow a little extra for emergencies. Hook rug wool can be used—one strand only being used; a very large bodkin will be required for this.

When the rug is completed, turn in the selvedge edge, and line with a light-weight hessian, as the wool cross-stitches will have made the canvas quite heavy. Cross-stitch rugs wear for ever, and can be made as large or as small as one wishes.

Double Cross-Stitch

For this one must know how to do a double cross-stitch, that is a St. George's cross first and then a St. Andrew's cross over it, or *vice versa*. Double cross-stitch is admirably suited to rug canvas, though it can be effectively used on a coarse-mesh material, such as hessian. Fig. 6 shows an idea for a large or small rug, made on rug canvas with black crosses made in rug wool, and pink double crosses made in double silk-finished ordinary four-ply wool. This pattern can be, as it is, enlarged to whatever size is

wished, or the alternate rows, vertical or across, can be employed. This idea is also a basis for many other patterns. There is no chart given, as the pattern is easy to follow, but it will be noted that some of the double crosses are worked one way and some the other: this is done purposely to show the worker, in order that she can judge whether she wishes to mix them or not. Note, also, that the block of pink double cross-



FIG. 7

Useful Rug Pattern

Showing Pattern A in Fig. 8 worked by the hook method on rug canvas. Turkey wool has been used.

stitches on the right-hand side is worked very tightly to show that an open-work effect can be obtained, which over a strong-coloured interlining is charming.

The Hook Method

This is perhaps the most popular of all hand-made rugs, but it must be stated that it is an expensive method, even though the rugs thus made last for ever. The wool weighs heavy, and each tuft takes quite a considerable amount in comparison to cross-stitch. There is, however, no disputing the fact that rugs thus made look lovely. There are many makes of rug wool, the

principal perhaps being cable and Turkey. Canvases, too, vary, but the usual is three holes to the inch. There is the ordinary hook, looking like a large crochet hook, but it is easier to work with a patent hook with a latch which locks the wool inside it and prevents the hook from catching in the canvas. This is called the "Erec"

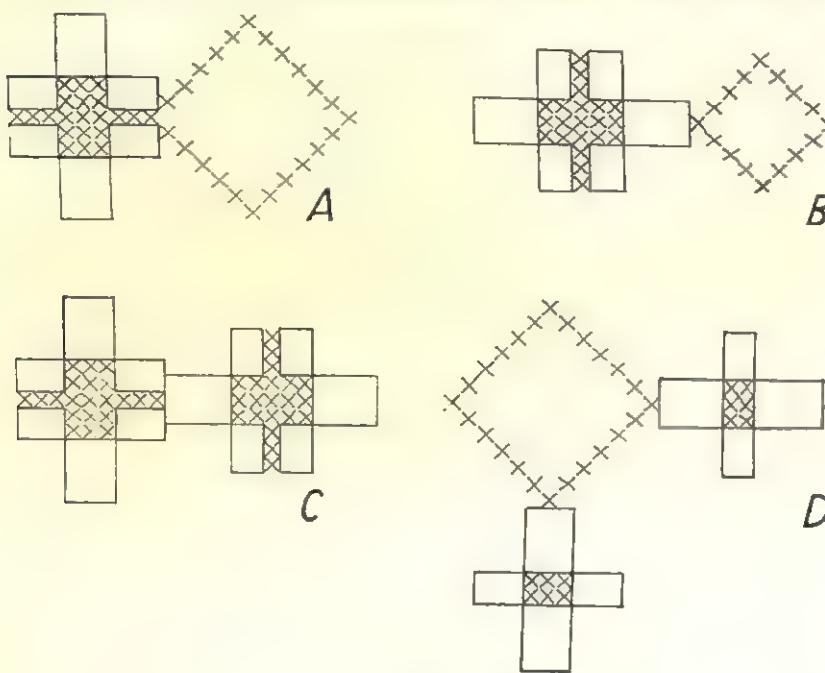


FIG. 8

Chart for Rug Pattern

Pattern used for rug worked by hook method (A). Continue for as long and as wide as required. B, C, and D show variations of the pattern. Such a pattern is capable of many combinations. In example worked Ground is green, Crosses are blue, and Interior of Diamonds and Lines is pink. Each cross represents one stitch.

hook, and can be bought anywhere. A gauge is also a necessity, and this is more or less standard.

MAKING THE RUG

Decide on your pattern: see that the canvas fits it. Turn the canvas in at the cut ends to about $1\frac{1}{2}$ in. and tack this securely. Canvases can be bought in different widths, viz. 12, 18, 27, 36, 40, and 45 in. Buy the wool and gauge. Wrap the wool evenly round the gauge and do not allow any of it to overlap. When the gauge is covered, cut along the groove with a sharp pair of scissors, and little scraps of the wool called "thrumms" are made. Take the hook in

the right hand and a thrum in the left. Fold the thrum in half: put the hook through a hole and bring it up under the strand of the canvas exactly opposite you. Put the folded thrum inside the latchet, lock, and draw back to the first position; release latchet with loop of wool below, close latchet on ends of wool, and bring

these through the loop. A firm knot is thus made over the strand of canvas. Repeat this until the whole of the canvas is covered, keeping the work in front of you all the time, and working towards you. Whether you work across, in rows, or work in the pattern first, is a matter for the individual to decide; so long as the work is held correctly it matters little.

When the rug is completed it should be lined with a light-weight hessian. Any loose ends should be trimmed, so that the pile is made smooth. If an ordinary rug hook is used instead of a patent one, the work is done by pulling the loop under the canvas thread and knotting above it, as an ordinary crochet fringe is made.

Fig. 7 shows a photograph of a very easy pattern for a hook-made rug: it can also be used for any other method.

The colours used are shown on Fig. 8, which also shows why this easy pattern was invented, since it can be altered and modified in a number of ways. All kinds of patterns can be used for hook-made rugs, and whole carpets can be made: the last line of holes of each portion is left to the end, when it is worked in with another strip, and thus any size can be made.

Patent-Hook Methods

There are several of these hooks on the market; but although they make rugs quickly, these have not, in the writer's opinion, the

charm of an ordinary hook. However, that is a matter of personal opinion, and the "Locker" needle hook is one of the best patent ones. This produces a Brussels carpet effect. The "Kwiku-mak" is worked on hessian on a frame, and has the advantage that hessian can be bought all ready stamped for working. With this instrument the work progresses very quickly, and the hook can be bought in three sizes, according to the kind of wool used. There is also the

The thrum should thus stand erect when the knitted ground is laid flat. Knit back the thinner wool: this makes the thrums taut. Continue doing this for the length required. Care must be taken that all the thrums are always towards you when knitted in. To finish off, knit one row plain, and cast off. There should be cast on an uneven number of stitches. It can, of course, be quite appreciated that the thrums need not all be of the same colour: patterns can be



FIG. 9
Obverse of Knitted Rug
(Example only.)

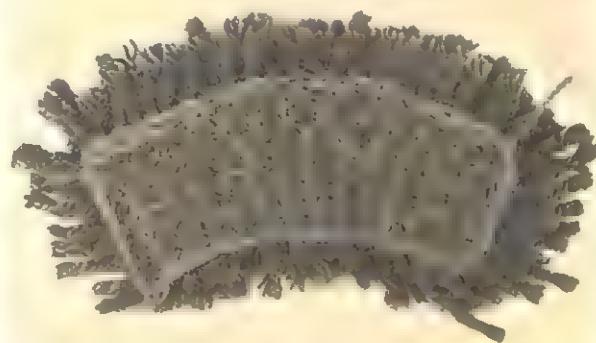


FIG. 10
Reverse of Knitted Rug
(Example only.)

"Catch-it" Rapid Rug Maker, and Faudels make a rug machine which will make a small mat in a few hours. As instructions are given with any of these instruments, it is unnecessary to repeat them here.

Knitted Rugs with a Pile

These are fairly durable, especially if they be well-lined with hessian, but large rugs made by this method are not to be recommended.

Cast on as many stitches as required on large needles, sizes 10 to 12, in a thick 4- or 6-ply wool. Have as many stitches as the length or width required. Knit one row plain. Have several thrums already cut, and in the second row work these in—knit a plain stitch, then take a piece of the wool and lay it on the thinner wool so that half of the thrum is towards you and half away. Knit in the front half, turn the rest of the thrum towards you, and knit the next stitch in the finer wool.

made, each square or cross in the canvas being taken as the two parts of the thrum. Figs. 9 and 10 show a small portion of the obverse and reverse of this method of rug-making.

A Wool-Saving Mat

This requires no knowledge of pattern making at all, and if well backed is quite an interesting rug to make; but because most of the wool is on the surface, it must be very well-lined. Use ordinary rug canvas, and turn in an inch all round. Across the holes from top to bottom, take ordinary cable or Turkish wool, thus leaving the back uncovered. Down the strands between the holes, run a thinner wool such as a coarse 4-ply. On the threads across the canvas, lock the two kinds of wool in each division by back-stitch. When all the divisions are locked, place rows of back-strokes down beside every thick strand. The saving in cable wool is of course very considerable, but the

method is not to be recommended in thinner wool. As already stated, there must be a very thick lining, for reasons which now appear obvious.

A Fur Rug

Strips of fur, such as from a sheep's skin, can be bought very cheaply, and these, sewn

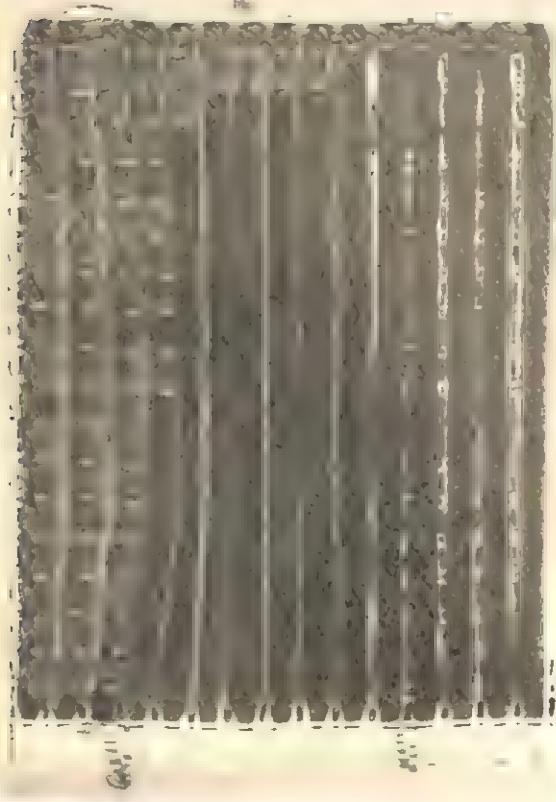


FIG. II
How to Make a Wool-Saving Rug

together, make lovely mats or rugs. Or it may be that you have two or more old fur mats or rugs which are shabby in parts: if the bad parts are removed, and the two or three rugs are then joined together, a totally good rug with quite a long life is made. People think it is difficult to sew fur, but it really is not. To join fur edges, place the two pieces together, of course on the wrong side, and oversew the edges. The secret

of successfully sewing two fur edges together is laid bare if you place a piece of thin cardboard between the two pieces of fur, so that it pushes down the hairs and leaves the edges free to be joined together. Never work very tightly, or the fur will pucker: on the other hand, do not work too loosely, or the edges will soon come apart. A happy medium, however, will soon be achieved. Use a strong crewel needle with a large eye, or a leather-needle with which gloves are made is very good. The latter is three-sided, and seems to pierce the skins very well. For thread use strong coarse cotton or packing thread.

TO CUT FUR

If possible a furrier's knife should be obtained, but a very sharp penknife will answer the same purpose. The fur should be laid on a flat surface (a board or kitchen table for preference), and where the fur is to be cut should be marked with chalk or thick pencil. One person should hold the fur taut while the other cuts—a slipped knife may ruin the fur.

String and Cord Rugs

ROUND, SQUARE, OR OBLONG RUGS

These are quite inexpensive to buy, but they do not wear like the home-made ones, and they are so easy to make that the merest novice can make one. Fig. 12 shows a very small mat, $7\frac{1}{2}$ in. in diameter, made in piping cord and very fine string. Piping cord is quite a good medium for a rug, since it washes; if the mat in the illustration is enlarged to the required size, it will be a very light but useful rug. A hank of piping cord (white) and half a hank of black made the small mat, so work out what is required for your own proportions. A small ball of fine string was more than sufficient.

TO MAKE THE RUG

Make a loop in the cord, then fill a crewel needle with thin string, and take this over the cord, winding it into a ring all the time. Continue doing this at equal distances, until the required size is made. In the example, a double thread has been taken over the white cord and

a single one over the black. This makes a variation, or single or double threads can be used over both colours, or the rug can be made in one colour only. The thicker the string is, the sooner the rug will be completed; but, when using very thick string for the binding thread, also use a cord in proportion. To work in another end is quite easy: do this gradually on to the old end, and make tidy afterwards at the back. The same method is employed when working in another colour. These rugs can be lined or not as wished—hessian is the best lining. To make a square or oblong mat, make the end of the cord or string into either of these shapes with the binding string; as the cord is worked round them, so these shapes will be made. Raffia rugs are made in the same manner, and many pretty patterns can be obtained by adding various colours in this medium, or in different coloured strings.

Embroidered Hessian Rugs

Embroidery on rugs can be very ugly or very pretty. If a thin material be chosen as a ground, the rug will look out of place, and of course will not wear; but embroidery on hessian (the thicker the material the better) can be beautiful. A bold pattern must be chosen, and the wool must be in keeping with the material.

The example shown (Fig. 13) is 1 yd. long by a little over $\frac{1}{2}$ yd. wide, and the embroidery is done through two thicknesses of Hessian. The pattern, it will be noted, is a very bold one, and the wool is a coarse 4-ply, which is couched on, i.e. one strand of wool is laid over the pattern,

while another strand keeps it in place with stitches at short distances from each other. In this instance, a different-coloured wool has been used for a couching thread, for photographic purposes, but it can be done in the same colour

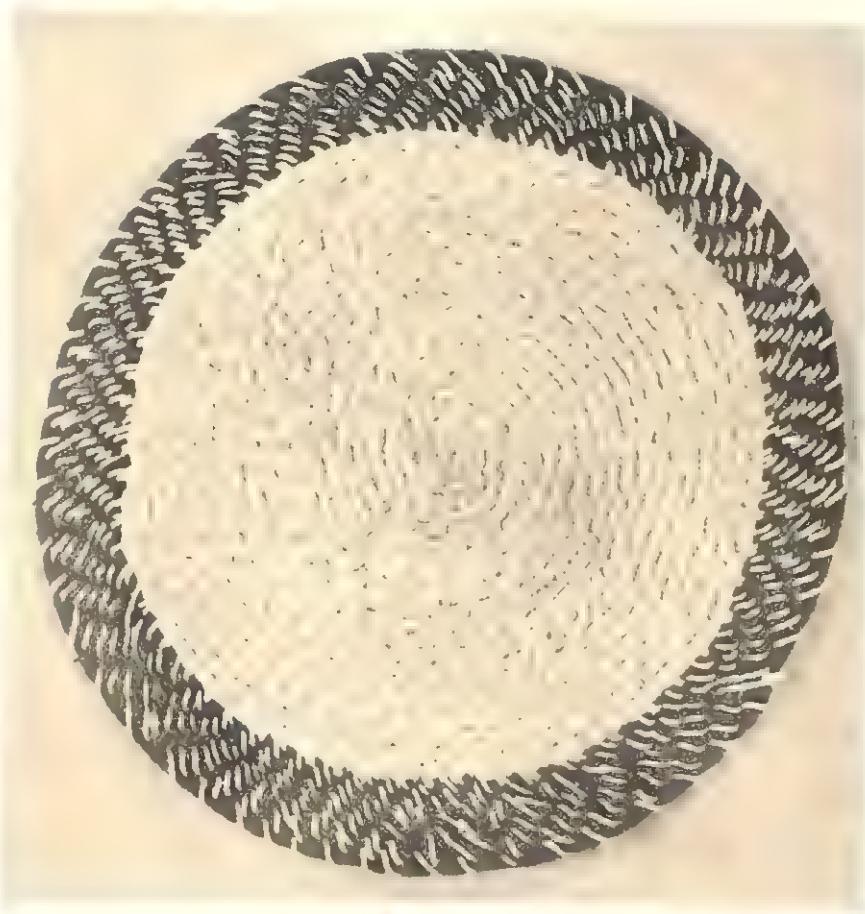


FIG. 12

Cord and String Rug

A small mat made in piping cord and fine string to illustrate how large rugs can be made in this medium, and in string, etc.

if preferred. The berries and the centres of the poppies and leaves are done in satin stitch, while the stamens are worked in long stitch. All these stitches are admirably suited to hessian and coarse work. For the worker's guidance, to work a similar embroidery pattern, half an ounce each of red and green for the couched threads will be sufficient, while the same amount of wool for the couching threads, etc., will be required. With such a bold pattern, bold work must be employed, and bold work

does not require much wool to be wasted at the back of the pattern.

TO LINE THE RUG

Two more thicknesses of hessian have been tacked on to the embroidered material, and the whole is bound with carpet or other braid. The

last for generations when properly made, and may eventually find their way into museums. Thirdly, buy sufficient of anything for the rug in hand—wools, although bearing the same number, often are not the same colour in another dyeing. And lastly, do not "skimp" the lining—a rug well-lined has the secret of long life.



FIG. 13
An Embroidered Hessian Rug

more thicknesses there are the nicer the rug will look; but the fact must not be lost sight of that, in binding, a needle has to be taken through the whole, so the more thicknesses there are the stronger the needle and the coarser the thread must be.

Hints on Rug Making

First and foremost, do not start *any* rug, expecting to finish it in "five minutes." Rug making is a work that can be picked up at odd moments, but it cannot be quickly done. Secondly, always buy the best materials—rugs

Conclusion

Rug making as a hobby is well worth while. It is so engrossing that, when one rug is completed, another pattern or a different kind of rug will be started. Girls will enjoy making rugs, since there is no question of each individual working differently—they can help one another (except, of course, in embroidered rugs), and if one girl is tired of one kind of rug, she can be put on to work at another. Once the design is made, the individuality of the person does not count so much as the accuracy of the stitches in this Art and Craft.

THRIFT CRAFTS

IN most households many useful things are thrown away, their possibilities not being generally realized. Pots, cardboard, odd scraps of material—there is a use for everything, and very attractive articles can be made for nothing if one is willing to give a little time to thinking them out. Not only are the things attractive, but they are useful too, and this will appeal to both teacher and pupil. Below are a few ideas, carried out in most instances for nothing; where some little thing has to be bought to complete the idea, it will only cost a few pence. By exercising a little ingenuity, both teachers and pupils will be able to evolve many others from them.

Decorated Cardboard Boxes

AN ARMCHAIR WORK-BOX

This is made from an ordinary cardboard box—if you can obtain one which is an unusual shape, such as those used for fancy notepaper, especially if it has one straight side to put against the chair, so much the better, though any box will do. Cover the whole box in cretonne or similar material. There is no need to buy specially: the lining can be of different material and pattern from the outside, so long as they harmonize. Cover the inside first, shaping over the outside on the wrong side of the material, and sewing in the corners to the cardboard to prevent "riding up." Cover the outside and put a braid or trimming as a finish. Buy half a yard of ribbon about an inch wide, and one or two tailors' weights. Sew one end of the ribbon on to the straight side of the box; the other end has the weight sewn into it. One weight will be sufficient if it is to tuck into the crease of the chair, and the box is not to hold very heavy things, but otherwise add two or more weights to prevent the box from falling to the ground. Such a work-box can be carried from chair to chair. Cardboard boxes can also have lids, and have a multitude of uses (see Fig. 14, 1A).

CARDBOARD (AND OTHER) HAT-BOXES

Hat-boxes, though useful, are very ugly about the rooms. Here is an idea for making them

beautiful at very little cost. Cover the hat-box inside and out with material to harmonize with the room. Here, as in the foregoing project, the pieces need not match—in fact, each side can be different, if one has a lot of small pieces the size of the sides. The lining is shaped over the outside and slip-stitched at the bottom of the four corners; then the outside is slip stitched to it at the top. (There are other ways of putting in lining to boxes, but this is perhaps the easiest.) When the outside is covered, add trimming down the sides if wished. (Do not forget to allow for the turnings.) Cover the lid as the box was done; but before adding the lining to this, sew a doll's body, bought at a "sixpenny store," to the top of the lid. Add the lining to the cover. Make a crinoline skirt to gather round the doll's waist—this can be in any kind of material, so long as it harmonizes with the rest of the box, and can have a fringe or not. A skirt made on the round with a hole in the middle to go over the doll's head will take a large piece of material, whereas a straight piece joined together and gathered round the waist will not require such a width. Use whichever method suits your material. A ribbon round the waist of the figure, and some little trimming over the bust, will complete the lid.

Very large boxes indeed can be covered in this manner, the head acting as a handle. (See Fig. 14, 1B.)

Discarded Wood Fruit Boxes

A BOOK-REST

Greengrocers are only too pleased to be rid of boxes tomatoes, peaches, plums, etc., are packed in, and from one of these can be made a useful book-rest. See that the box is clean. Knock out the bottom and one of the long sides; cover the remaining three sides with ribbon. For an ordinary box, a yard and a half of ribbon 4 in. to 5 in. wide should be needed, but it would be as well to measure the particular box for length and width. With regard to width, see that the ribbon is a good inch wider than the wood, as if it is not the roughness of the wood will soon wear the ribbon into holes.

Place the ribbon on the wood, and take two or more long stitches through both sides of the ribbon at the elbows, which are the sides of the book rest. This keeps the ribbon in place, and it is now easy to buttonhole the rest of the ribbon together over the wooden frame. Use an ordinary embroidery cotton or silk to match the ground of the ribbon—a skein should be ample. If the ribbon is too wide—which is better than

ject can also be carried out with wallpaper covering. (See Fig. 14, 1C.)

Beads

THREE IDEAS FOR NECKLACES

CURTAIN BEADS ON STRING. These make quite attractive necklaces. If you have not any old bead curtains by you, they can be bought for

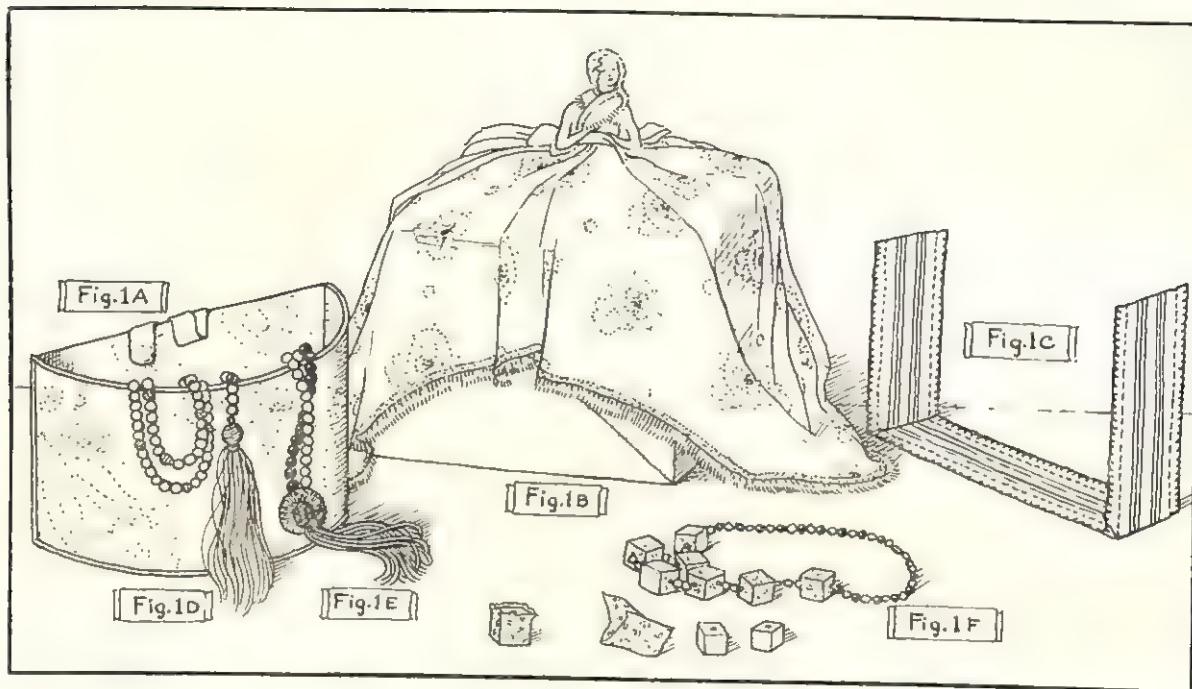


FIG. 14
A Group of Thrift-Craft Projects (1)

A = Work-box made from cardboard box.
B = Ordinary cardboard hat-box covered.
C = Book rest from wooden fruit box.

D = Necklace from curtain beads.
E = Two short necklaces making one long one.
F = Passe-partout covered beads.

its being just wide enough—put a row of running stitches near the edge of the wood, through both ribbons, but be careful not to take it too near to the wood so that it drags. The outside of the long stitches over the elbows can be buttonholed, so that they do not break. Such a little book case is most useful—it can be put anywhere to hold one's favourite books, and makes a charming present. Large ones can be made with still wider ribbon, or material; but with regard to the latter, all raw edges must be turned in before covering the wooden frame. The pro-

about sixpence a hank, sometimes cheaper, and a hank will make a good number of necklaces, of course according to the lengths required.

To Make. On a length of string very much longer than required, thread the beads, making a knot after each one. The knots will thus take up the surplus string. When the necklace is the length required, knot both ends together, and add either a tassel of beads, or a bought one. (See Fig. 14, 1D.)

BEADS OF TWO COLOURS. When two necklaces

have broken, and there are not enough in each for a necklace, here is a new way of re-threading them. Instead of the beads being alternate, they are all one colour one side, and another colour the other, fastened with a long tassel of some description. New necklaces can be treated in the same manner. (Fig. 14, 1E.)

PASSE-PARTOUT COVERED BEADS. This is for the lover of passe-partout work. You will require: about 100 ordinary-sized necklace beads; 9 or 11 ordinary square wooden beads at 6d.

the bead, and cut another nine pieces of binding the same length. Wrap the beads in this, so that each bead is completely covered in passe-partout. Leave to dry, then trim. With a needle find the holes in the beads and pierce. Varnish each bead thoroughly and leave to dry—usually about twenty-four hours. To obtain a still brighter gloss, varnish again when the first coat is dry. Thread the beads as is usual, placing the passe-partout covered ones in the front. (F in Fig. 14.)

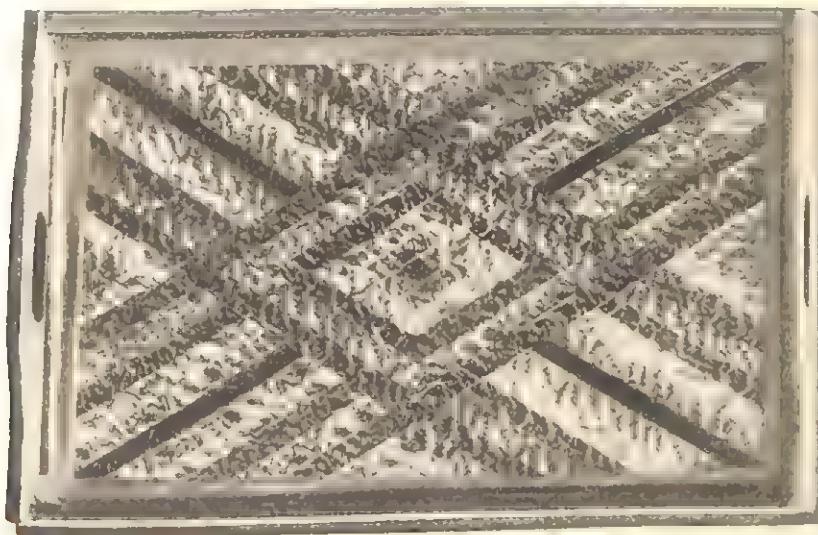


FIG. 15

An Old Wooden Tray Renovated in Passe-Partout Binding

or 9d. a dozen; a roll of fancy passe-partout binding to match the ordinary beads; a clasp; strong bead thread and a needle; a pot of good wood varnish; a brush and pair of sharp scissors.

To Make. The necklace illustrated is made in red and opalescent beads, with the wooden ones covered in speckled red passe-partout binding. Prepare the wooden beads first of all. If they are $\frac{5}{8}$ in. square (as those illustrated), cut nine pieces of binding, each $3\frac{1}{4}$ in. long. Cover four sides of each bead in a piece, making the end wrap well over: the length of the binding allows for this. Two sides of the bead are now exposed, but do not do anything further with these until all the beads are covered as the first, and the binding has dried. Then trim down to

This is a splendid way of renovating a broken necklace of which several beads are missing. Round beads can also be covered, but are very much more difficult to do.

Covering an Old Wooden Tray

Passe-partout will serve countless uses; it can, for instance, make an old wooden tray look like new if applied as shown in Fig. 15. Take two or more rolls of different coloured passe-partout binding, and stick over the tray from corner to corner as in example, so that the effect is that of ribbon. The binding used is what is known as decorative tape and is especially suitable for this work. Varnish or not—if the tray is to be used for hot dishes, etc., do not.

However, if the binding is properly applied, it should not come unstuck, however hard it is handled. When dry the tray is ready to be used.

It should be mentioned here that patchwork is one of the most fascinating crafts known—it costs practically nothing, and almost every needlework idea can be carried out in it.

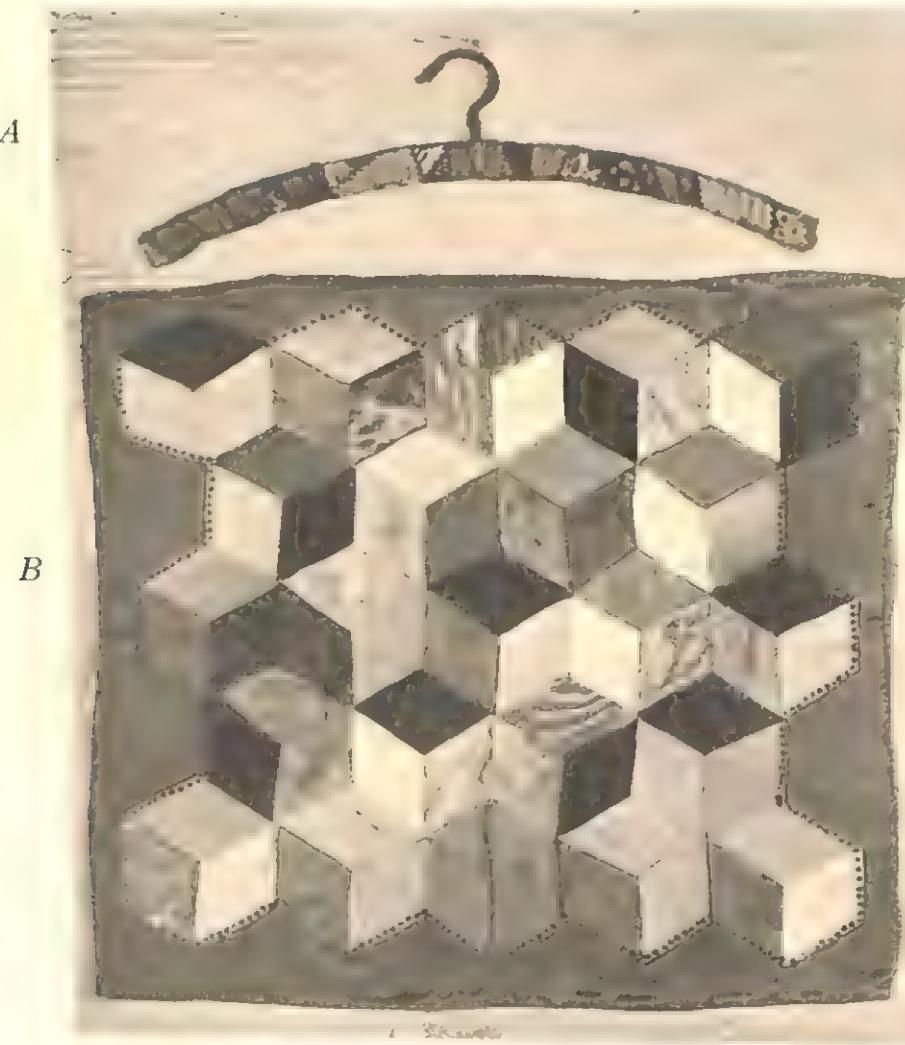


FIG. 16
Two Projects in Patchwork

Patchwork

This is a most fascinating thrift craft, and even the tiniest scraps can be utilized. It is a large subject, so only two examples have been given in Fig. 16: *A* is an unusual article on which to use patchwork, and one for which very small pieces can be employed; *B* is given because of its unusual edging round the patchwork.

DRESSHANGER COVERED IN PATCHWORK (*A*, FIG. 16)

This can be made by quite a small girl. Take an ordinary dresshanger and cover the hook with twisted ribbon. Put on one side while the covering for the hanger is made. Take a piece of calico, 18 in. long by 3 in. wide, and cover with small pieces of silky material.

Outline each piece with feather-stitching. Make a hole in the exact middle for the hook to go through; push it through, and draw the hole together so as to make it neat. Slip-stitch the two long sides together over the wooden hanger: do the same for the ends, and the hanger is now ready for use.

PATCHWORK CUSHION IN "Box" PATTERN

The "box" pattern was a great favourite in old quilts. It consists of three diamonds arranged so that they form a "box." There must be a ground of plain material, which is put on one side until sufficient boxes have been joined to each other to cover the front of this ground, so that only a narrow margin is left all round. The patches are sewn over brown paper diamonds; when they are all joined together, these diamonds are taken out. To make the patchwork firmer, if the outside diamonds are covered over hessian, this can be kept in. Place patchwork on ground. Instead of buttonholing all round the edge, sequins and beads can be used to keep the "black" patch in place, though, of course, buttonholing can be used as an alternative. This is a good way of using up odd sequins and beads as well as silk pieces (B, Fig. 16).

Ribbon Projects

Tiny scraps of ribbon are often left lying about until they are dirty, and consequently useless. Below are three suggestions for using up odd lengths of ribbon.

A WORK-BAG

All odd lengths and widths can be used on this. Make a foundation of hessian, and on this sew the odd scraps of ribbon, either down or across. No piece will probably be long enough to go from edge to edge of the hessian, so join another piece of the same width on to it. Continue doing this until all the hessian is covered. All widths of ribbon, braid, and insertion trimming can be mixed, so long as the straight line is kept. A variation is to have one side of the bag with the ribbon vertical and the other side horizontal. If one has not sufficient ribbon all at once, the bag can be

added to as the ribbon is obtained. When the hessian is covered, the sides are joined together: the bag is lined in the usual way, and handles, rings or cord are added. (A in Fig. 17.)

FAN CASE MADE FROM BROAD RIBBON

This method can also be used for a case for knitting pins, spill case, etc., and is quite a good way of utilizing a broad piece of ribbon for which one can see no use. There will be required half a yard of ribbon, $2\frac{1}{2}$ in. wide, the same amount of another colour for lining, and (if one wishes to make the case doubly strong) the same length of webbing as an interlining. Tack all three ribbons together, and buttonhole or turn in the two ends: divide the strip in half and join together at sides to make a case by buttonholing. The case is now ready for use. (See B, Fig. 17.)

WOVEN RIBBON HANDKERCHIEF CASE

A case of this type is a popular and economical project. Although two kinds of ribbon only are used in the illustration, it can be made, like the work-bag, of scraps of different-coloured ribbons interwoven. They are woven in the ordinary way, the warp first being sewn securely at one end to a calico ground, and the case is made up in the usual way padded with cotton wool. When buying ribbon, always measure up to the size you propose to make the case—it is most annoying to be half a yard short. This idea can be used on cushion covers, nightdress cases, and pochettes with most attractive results. (C, Fig. 17.)

Pattern Making

Small articles, such as match-boxes, rounds and squares of all sizes, triangles, leaves, petals, etc., if arranged in various ways make useful embroidery patterns. They are quite easy to do. Take a piece of tracing paper, and draw on it the circles, etc.

Then place this design over the material which is to be embroidered, with a piece of carbon paper between, and with a sharp knitting pin go all over the outline of the design. Work in whatever stitch you fancy, or is suitable to the pattern. In Fig. 18, A shows a runner with the two ends worked in a design made from

match-boxes, and worked in cable stitch. Note the unusual shape of the runner.

Decorated Pots

Never throw away jam pots—they make splendid flower vases, and can be painted in all kinds of ways, or covered in scraps of pas-

te to be put into another plant pot. Buy two 2d. tins of "Crusoe" paint, one a dark and one a light colour. Paint the pot all over with the dark colour and leave to dry. Then put daubs of the light paint all over it, not minding if the daubs run into each other. When this has dried, the pot should look like an expensive art enamelled one. Two 2d. tins of paint will be sufficient for one large flower pot, or for two or three small ones. (C, Fig. 18.)



FIG. 17
Uses for Odd Lengths of Ribbon

partout binding, gummed or art paper, which when dry are varnished, so that they can be wiped over with a damp cloth. B in Fig. 18 shows a glass jam jar so treated: china jam jars can be decorated in the same manner, as well as ordinary plant pots.

PAINTED EARTHENWARE PLANT POTS

Ordinary earthenware garden plant pots can be painted in a "crazy" manner, and do not need

folders for papers, baskets for vegetables. Senior pupils will be able to work out many ideas for themselves.

WASTE-PAPER BASKET

A seven-pound biscuit tin covered in wallpaper makes a practical waste-paper basket. The tin is not covered inside, so it can be washed over should anything sticky be put into it. These tins can be bought at any grocer's for

Wallpaper Projects

A FIRESCREEN

Fig. 18, D, shows an inexpensive firescreen, made from a large advertisement card, such as grocers and chemists are glad to give away. One with a strut should be obtained. The front is covered with wallpaper. House decorators are always glad to dispose of their old books of patterns, and some of these are really beautiful. One or more pieces can be used, borders and cut-outs can decorate it, and the screen will look extremely nice in a grate or hiding an ugly corner.

Wallpaper can be used for a variety of projects—for covering boxes, for blotters, splashes, decorating furniture, etc. In fact, there is no end to its usefulness—



RUG MAKING

Crochet-hook Rug. (A knitted "Mickey Mouse" toy is shown on the rug; see p. 169)
(727) iv

String Rug made with Needles
Applique Rug
Cross-stitch Rug

Thrift Rug

1s. or less. If the outside of the tin is varnished over the wallpaper, this too can be sponged with a damp cloth.

Small Pieces of Material

Small scraps of cretonne, casement cloth, etc., which are just too large for patchwork, but

A MEDICINE-BOTTLE PROTECTOR

This is made from a small piece of washing material, such as huckaback—about 8 in. square. Bind all round with ribbon; cut a hole in the middle, and bind this also. The "jacket" now slips over a medicine bottle, and any drips from the latter are soaked up by the material. If the

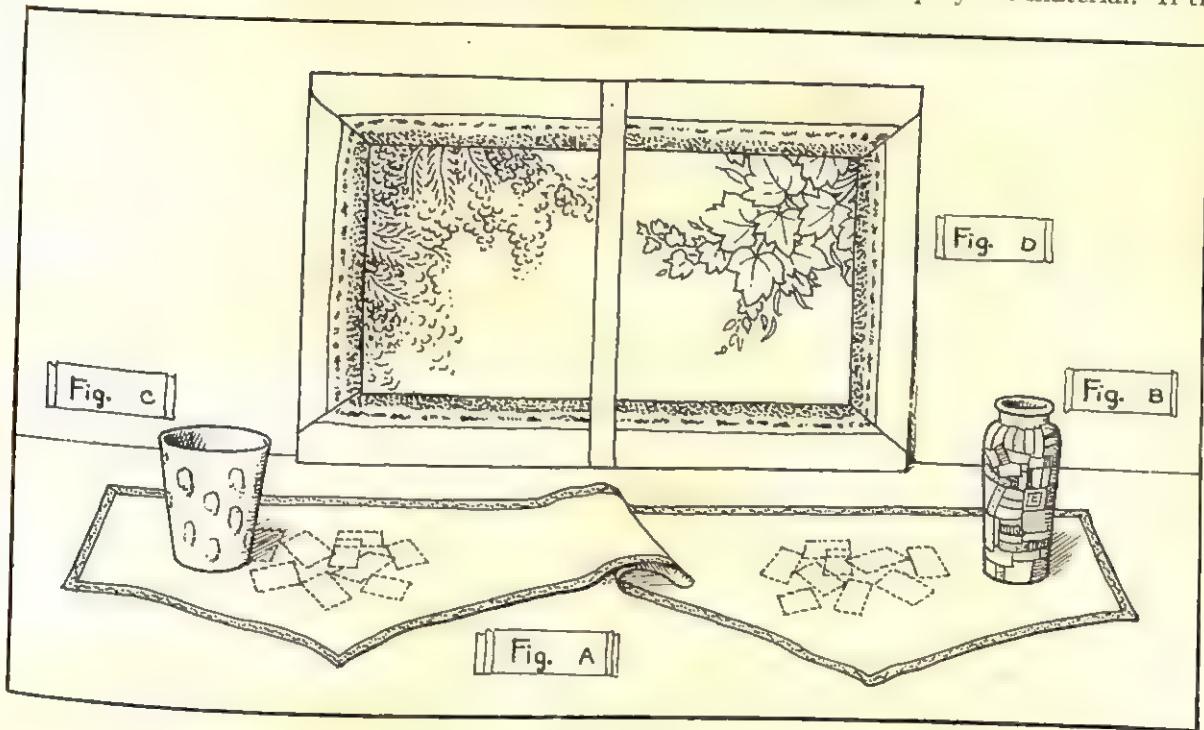


FIG. 18

A Group of Thrift-Craft Projects (2)
Table Runner, Flower Pot, Plant Pot, and Fire-Screen.

seemingly not large enough for anything else, may make the following three useful articles.

A HOT-GLASS HOLDER

Cut a circle of hessian the size of the *top* of the tumbler and cover with a piece of cretonne or other material on one side only. (Flannel or cloth can be used instead of hessian.) Now take a piece of hessian about 3 in. deep and long enough to go all round the covered circle. Cover this strip on one side with material and sew it on to the edge of the covered circle; join the sides together. Join lining on to the top, turn the case inside out, and slip-stitch a lining round on to the bottom. Suitable washing materials should be used. (Fig. 19 a.)

neck hole is made rather large, a pleat or two can be lightly made in the material to make it fit a small bottle; when that particular bottle of medicine is finished, the jacket can be taken off and washed, and put away for another time. (Fig. 19 b.)

A LABEL CASE

Small pieces of any material make this. If the material is plain, girls will have an opportunity of making up an easy design to embroider on it. It can have either a flap (if there is sufficient material) or press studs to close it. For ordinary labels, 24 in. of ribbon or material about 5 in. wide will allow for a flap and for a division inside the case so that tie-on and stick-on

labels can both be included. $1\frac{1}{4}$ yd. of narrow ribbon for binding will be sufficient. To make the case, cut off 7 in. from the end, and turn up the end 7 in. Put the cut 7 in. of ribbon inside the turned-up ribbon to make the pocket, and tack all three pieces of material together. Bind along the top of the two pockets, then bind all round. (Fig. 19 c.)

A PINCUSHION

This pincushion has a powder carton for the base. Use either the top or bottom of the

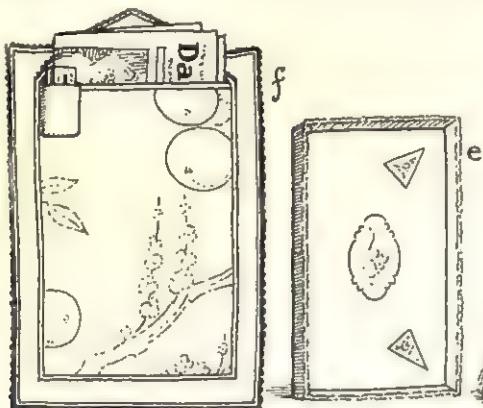


FIG. 19

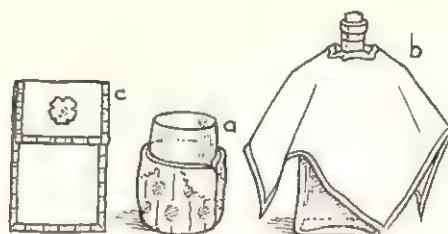
(a) Hot-glass Holder. (b) Medicine-bottle Protector. (c) Label Case. (d) Pincushion.
(e) Tray. (f) Newspaper Rack.

carton, and put this in the middle of a circular piece of material, cut from a good-sized teaplate. Gather the material round so that the gathering thread comes just above the rim of the carton. Put another gathering thread rather near the top of the material. Have some bran ready and put this into the carton after you have drawn up the first gathering thread. Continue filling the covered carton with bran until it is very full, then draw up the other gathering thread. Take a china head (small ones, with pierced holes in the neck, can be bought for 1d. or 2d.). Fix this securely on to the top of the gathered-up material. Make the "lady" a skirt of lace or fringe or ribbon (any odd scraps, as the flounces need not match),

working from the rim of the carton up. A ribbon or cord round the waist will be a finish. (Fig. 19 d.)

A TRAY

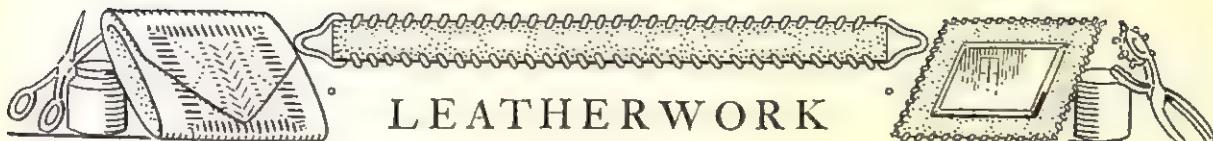
The lid of a box can be covered in paper and/or material and makes a useful tray for needles, cottons, pins, etc. The one shown in Fig. 19 e is made from the lid of a shoe box. On the inside paste some art paper. When this is dry, cover the outside with any odd piece of material, provided it is large enough to cover the whole of the outside, including the sides. On the inside of the sides add ribbon and along the top a rose trimming—if you have any transfers by you, these can be put on the art paper. The tray can be covered entirely in paper or in



material—the latter of course is more durable. (Fig. 19 e.)

A NEWSPAPER RACK

This is made from a strong piece of cardboard which is easily bent. Cover with any material on both sides, and on the front place a pocket of cretonne to take the newspapers. Decorate with braid or trimming of some kind. On the pocket can be placed a little bag for matches. The top of the pocket must of course be bound or neatly hemmed, and there must be a cord to allow it to hang. The cardboard should be bent before the pocket is added, so that the latter hangs away from the covered cardboard ground. (Fig. 19 f.)



LEATHERWORK

I. General Considerations

LEATHERCRAFT opens up a very wide range of interesting work when used as a school craft. With the new material come new methods and new problems, while the ease with which it can be worked makes it an ideal substance for young fingers. From the standpoint of utility leather still remains the strongest flexible substance in common use.

Too often the question of expense proves detrimental to the use of leather as a craft material, but, as most leather manufacturers to-day have special terms for material used for educational purposes, this question has to a great extent been answered. Even so, leather-work can, but need not necessarily, become expensive. Experimental work with paper and scissors will eliminate a great deal of waste in the more expensive material, and the waste of ill-considered effort will be done away with in striving continually in this selective direction. Then whatever artistic powers the pupil may possess will be developed to the full.

Selection of Skins

The careful selection of a skin most suitable for the work in hand is an important factor, owing to the fact that skins vary in character, no two being quite alike. Individual skins, too, show considerable variation in different parts; for example, the leather is most elastic in the direction of width, which is, of course, essential in order that the animal may breathe. Thongs, straps, and laces, therefore, are always cut in the direction of length of the skin.

SOFT LEATHERS

There is a wide range of skins in various colours for work in soft leathers. These skins are usually dressed either for a natural grain on the smooth side or a good pile on the velvet side, but both these qualities can be obtained in combination when desired.

Sheepskin prepared as a natural Basil is inexpensive, and is very suitable for school work. It is dressed to retain the natural grain, and in colour is somewhat like old ivory. This skin can also be obtained in a brown antique finish, and varies in size from 6 to 10 sq. ft. It is very suitable for articles having hard wear: bags, book-covers and carriers, etc.

Velvet Persians are dressed with a view to their yielding the finest and silkiest pile. The grain, or smooth side, of velvet Persians is generally imperfect. The skins are admirable for making up dainty articles and can be obtained in about sixty colours. The average size of the skin is about 5½ sq. ft.

Calf-finished Persians are dressed for the grain side and are obtainable in tones of brown. They are suitable for general fancy leatherwork.

Suede split hide is a strong, cheap, and economical leather very suitable for use in schools. The skins have a pile on both sides, and are obtainable in about thirty different colours.

MODELLING LEATHERS

Modelling sheepskin is very suitable for practice in modelling. As it is a cheap-grade leather, stains do not show to the best advantage. The average size of the skin is about 7 sq. ft.

Modelling hide is a durable, firm leather which will take the stain and models well. The hide is supplied in various thicknesses, and is generally used for most ordinary purposes. Usually obtainable in half-hides containing about 22 sq. ft.

Calfskin is the most suitable of all leathers for modelling and staining. It is obtainable in three substances: stout, medium, and light; either natural or in shades of brown. Skins of "practice calf" vary from 10 to 14 sq. ft. each.

THONGS

It is preferable to buy these ready cut. They are obtainable in "natural" calf (for subsequent staining to suit the work in hand), stained "antique," or in Persian sheep. The cut thongs

vary in length from 30 in. to 36 in., or may be obtained in continuous lengths.

Tools

The equipment necessary for soft leatherwork is not extensive. The most suitable form for a cutting board is a piece of zinc, approximately $1\frac{1}{2}$ ft. sq. Millboard or thick glass may be used for this purpose, but the metal is preferable, as it does not take the edge off the knife so quickly. A sharp knife is required; a pair of scissors; a straight-edge to guide the cutting; a pencil compass; and a tin of vegetable glue or a tube of seccotine. For cutting the holes to receive thongs, either a pair of single-hole spring punch pliers or six-hole punch pliers are necessary. The latter are useful when holes of various sizes are required.

The tools required for modelled leatherwork are similar to those employed in soft leatherwork with the addition of a "thonging tool" and a small hammer. The "tool" takes the place of the punch pliers. With it "slots" are produced in the leather, which allow the thongs to lie flat. If round holes were used in the heavier modelling leathers, they would cause the thongs to curl up in an unsightly manner. The most suitable modelling tool is the "broad modeller" (Fig. 2 (ii)), which has a broad blade at one end and a finer blade at the other. Under no circumstances should a *steel* straight-edge be used on modelling leather, as the stain produced cannot be removed.

II. Soft-Leather Work

All work in soft leathers should first be developed as a paper pattern, remembering that the component parts of an article must form a beautiful and consistent whole. The paper pattern will not only help in making the most of the leather when cutting out, but will eliminate wastage caused by mistakes, etc. The pattern can be transferred to the back of the leather by means of a soft black pencil.

Cutting

The work should be placed upon the zinc plate or millboard and with a straight-edge held

firmly in position; the cut made with the point of a very sharp knife (Fig. 9). The straight-edge must be held quite firmly, otherwise the leather will stretch and give a ragged edge or develop a wrong shape. Round edges can be cut with a pair of scissors.

Making Up

This work is started by slightly seccotining the edges of the separate pieces and pressing them together until they adhere firmly. This keeps the leather in position whilst the thonging holes are being pierced. Another method is to secure the edges by means of wire paper clips (Fig. 6). Still another method is to place the two leathers correctly together and punch a few holes: then thong this portion together with string to hold the leathers in position while proceeding with the punching.

Punching Holes for Thonging

When the component parts of the article have been assembled and held together with adhesive, a line will be required at $\frac{1}{8}$ in. from the edges to act as a guide for the punching. To obtain this, set the compass points $\frac{1}{8}$ in. apart and, running the needle point down the edge of the leather, mark off the line with the pencil for the full length required for thonging (Fig. 10). The guide line should finally be divided into intervals of $\frac{1}{4}$ in. The points of intersection will be the centres for the holes. When holes are being punched, care must be taken to see that the centre of the punch coincides with the points marked on the leather. Sometimes when several pieces of leather are in use, the punch does not pierce quite through. When this occurs, place an old scrap of leather at the back and punch through the entire thickness.

Preparing Thongs

To prepare a thong for threading, cut one end to a point with the scissors. Carefully dip this point into seccotine and allow to dry: this produces a firmness which makes lacing much easier. Care should be taken not to draw the thongs too tightly in soft leather or a puckered

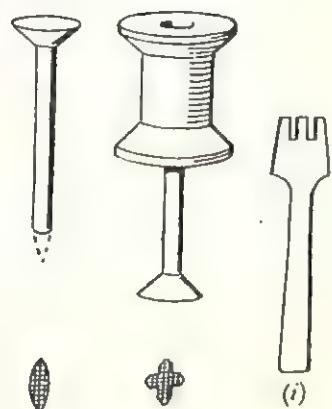


FIG. 1
Nail-head Tools

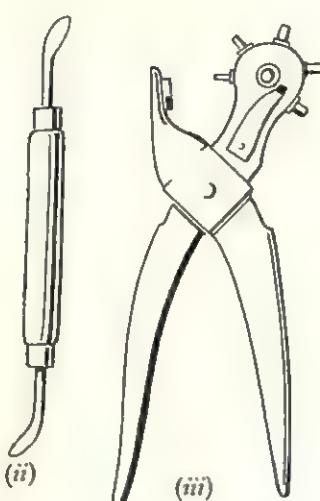


FIG. 2

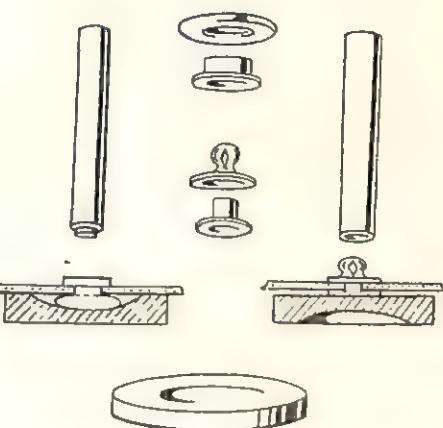


FIG. 3
Press Button, Punches,
and Die

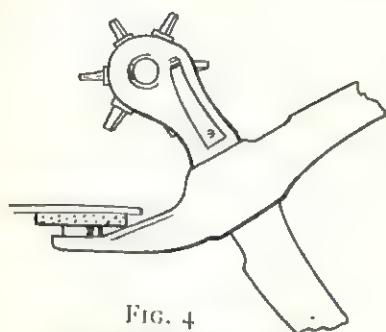


FIG. 4
Cardboard Support

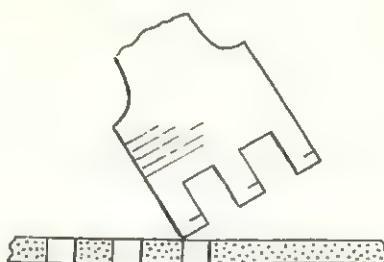


FIG. 5
How to Register when Slotted

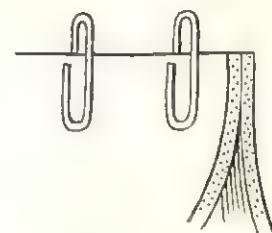


FIG. 6
Paper Fasteners Used
in Making Up

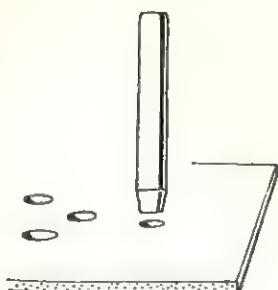


FIG. 7
Single Punch for
Interior Work

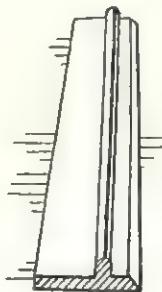


FIG. 8
A Useful
Straight-edge



FIG. 9
Cut with Point of Knife

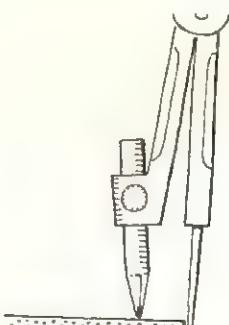


FIG. 10
Marking the Leather
for Thonging

Tools and Methods of Working

appearance will result. Very long thongs should not be used, for in being pulled through hole after hole they will become narrower under the continual strain. The maximum length for threading is about 3 ft., and further lengths can be joined on as required.

To make a joint in the thonging, the top side of one of the ends and the under side of the other should be "skived," or pared to a chisel edge. A very small quantity of adhesive is rubbed on each and the joint made. The two pieces should be pressed firmly together until set. The joint should be long enough to traverse at least two holes. Calf and Persian thongings may both be joined in this way.

Thonging

To start the thonging, thread through the first hole from the front to the back, leaving a skived end towards the front. This skived end should be sufficiently long to be carried up over the edge to the back, so that when the first stitch is brought over from the back to the front it crosses the loose end at the back and holds it in place. The skived end is further secured by a little adhesive. An alternative method is to thread the thong through the first hole from front to back, but in this case a skived end about $\frac{1}{2}$ in. in length is left at the front: this is carried straight over and stuck down at the back. The thong is then brought over to the front and threaded a second time through the first hole from front to back, and finally pulled tight, thus binding the skived end (see Fig. 12).

Endings are dealt with in a similar manner, and should present no difficulty. It is advisable to thread the thong through the holes loosely at first, to be tightened up and aligned afterwards.

Thonging the Edge

Thonging well done is a decoration in itself and should be given very careful attention. The simplest form of stitch used in thonging is known as "single whipping." This stitch is the same as plain oversewing, the thong being threaded from the front, back over the edge, and through the front again (see Fig. 13).

The "double whip" is similar to the "single

whip," but the holes are spaced a little closer together and two thongs are threaded through alternate holes. The best method is to arrange the holes so that the thongs just touch each other as they lie side by side at the front. A good effect can be obtained with this stitch if thongs of different colours are used.

In the stitch known as "whip and run," one stitch is whipped as before but the next is carried along horizontally, followed by a second whip. The crossed whip is worked by using two thongs, one on each side of the leather.

There are two methods of working the "blanket stitch." In the first, two thongs are employed. One of the thongs is first worked as the "single whip," while the other thong (working now on the edge of the leather) is threaded back under the first stitch of the whip, forward over the first and second stitches, back under the second, forward over the second and third, and so on. The second thong will draw itself to the front when tightening.

The second method is similar to that used in embroidery. The thong is taken through the hole from back to front, brought to the top edge and looped to form a knot. It is then carried along the edge as far as the next hole, taken down and through the hole from the back, up to the top edge, and looped through the portion lying along it, this forming a second knot. This process is repeated.

To start the simple "lock and run" the thong is first attached at the back. It is then threaded through the first hole to the front, carried up over the edge to the back and through the second hole to the front again; it is then carried under the first stitch at the front, back *over* the same stitch (still at the front) and lastly through the third hole from front to back. The whole process is then repeated.

The "double lock and run" is begun at the back: thread through the first hole to the front: run one spacing along front, through second hole to back, up over the edge, down the front, through the third hole to back, up under existing stitch at edge, down the back, through the fifth hole to the front. Then begin in the second run and repeat.

The right degree of tightening for the various stitches will be arrived at after a little practice.

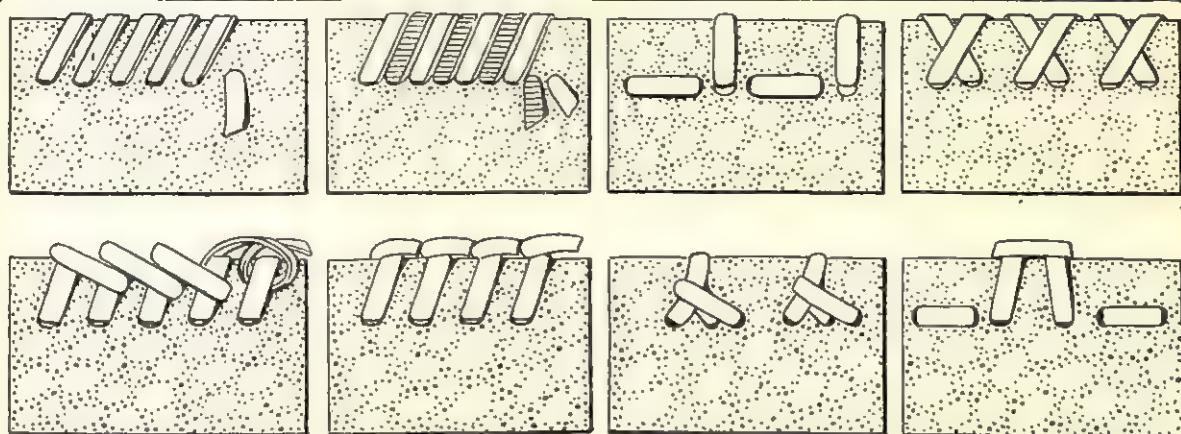


FIG. 11
Thonging Stitches

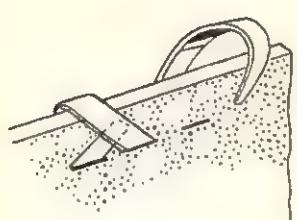


FIG. 12
Methods of Starting Thonging

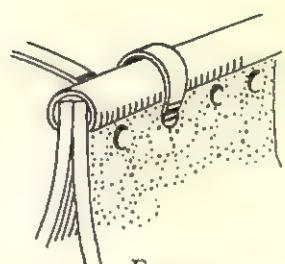


FIG. 13
Binding the Edges

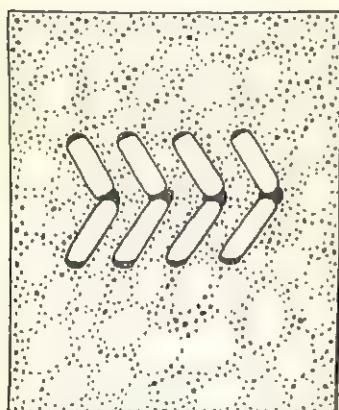


FIG. 14
Lacing Stitches for Interior Work

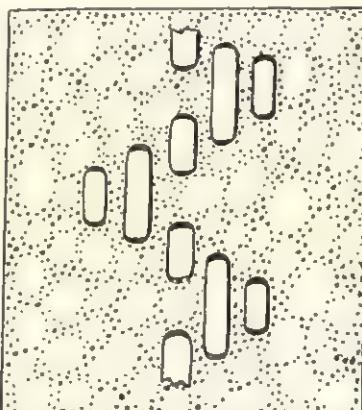


FIG. 15
Lacing Panel On

Thonging and Lacing Stitches

In finishing, the stitches are lightly and carefully hammered to flatten them, and if properly worked they will sit evenly along the edge.

The Tassel

Tassels can be made from an oblong strip of leather, fringed to within $\frac{1}{2}$ in. from the top edge. A little seccotine is rubbed on the smooth side of the uncut portion, and the leather rolled round two or more thongs. The end is pressed down firmly with adhesive and held in the fingers until it sets (see Fig. 32).

Handles

The essential points of a handle are: that it shall be strong and firm and comfortable to hold; and that it should form an integral part of the design. Three pieces of leather are required for a handle suitable for a pochette, and two smaller pieces for attaching it to the case. The handle is lined and thonged so that it may not become limp with constant use. The two *smaller* pieces, which can be of any shape which conforms to the design of the pochette, are decoratively thonged in position (see Fig. 26).

The Radiating Strip Handle

Several strips of leather, tapering from about $\frac{1}{2}$ in. in width, and a large ivorine ring are required to make this handle. The strips are made to the length required, and, in the case of calf, are skived down for a distance of 1 in. at the narrow end. This end is taken through the ring in each case and the skived end brought into contact with the back of the strip and made secure by thonging. The free ends of the strips are taken through slots equally spaced in the bag, and finally brought through to the inside. The strips are decoratively thonged to the bag (see Fig. 27).

Fitting Simple Strap Handle

Slots are cut in the sides or back of bag of a width equal to the handle. These should be spaced one below the other at distances equal to the width of the handle. The handle is made

large enough to be carried backward and forward through the slots, coming to the front at the lower one. The end of the strap should be pulled through to a sufficient length for fringing or for shaping to receive a tassel. The portions of the handle appearing on the inside of the leather are decoratively thonged to the bag (see Fig. 28).

Fastening for Bag

A small oblong piece of leather is cut and rolled in the same way as with the tassel. When it is set, a hole is punched through the centre of the roll to take a thong. One method of attaching the thong is to fold it in two, place the roll in the fold, and bring the two ends of the thong back through the hole so that they emerge one on each side of the fold. The two ends are attached to the flap of the bag. A loop of the leather or thong placed in the body of the bag completes the fastening (see Fig. 29).

Methods of Decorating Soft Leatherwork

One of the simplest forms of decoration is that produced by punching. By varying the spacing, the grouping and the size of the holes, a series of patterns ranging from the simple to the intricate can be formed. The patterns should first be worked on squared paper and then the centres of the holes transferred to the back of the leather by pricking.

Coloured designs can be produced, where the leather has a backing, by inserting discs, saved from punching contrasting leathers, into the holes. They are held in position by a touch of seccotine. Care must be taken to see that the leather is not pinched between the pliers where the pattern extends for any distance inside the edge of the article. Appliqué is that form of decoration where simple but bold designs are cut out in thin leather of contrasting colour to the background, and pasted into position on the article to be decorated. For further security the edges may be stitched round with silk (see Figs. 16-18). Stencilled patterns can be applied very effectively to leatherwork. For methods, etc., see chapter on Stencilling, Volume II.

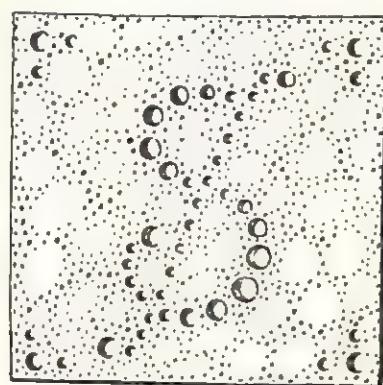


FIG. 16
Punched Pattern

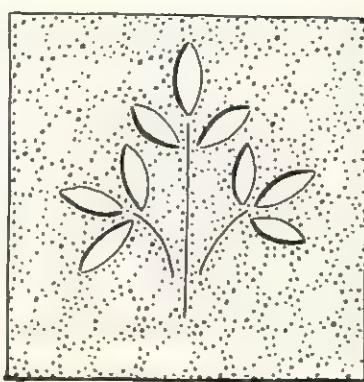


FIG. 17
Nail-head Pattern

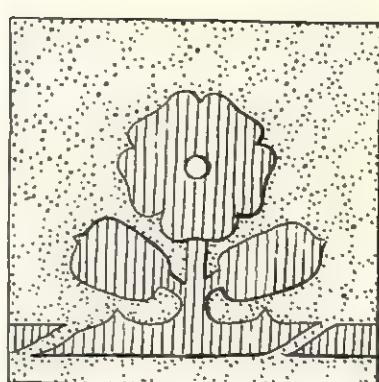


FIG. 18
Appliqué

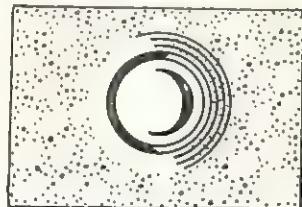


FIG. 19
Mounting Ornamental Stones

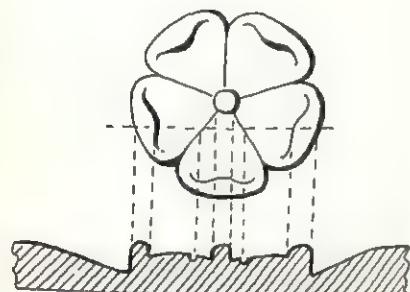


FIG. 20
Sinking and Modelling



FIG. 21
Method of Forming
Serrations

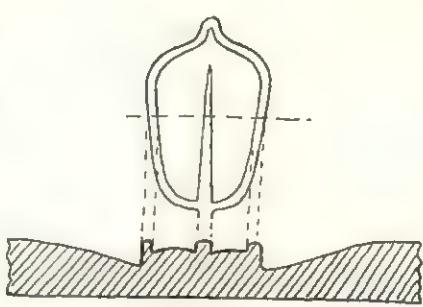


FIG. 22
Sinking and Modelling

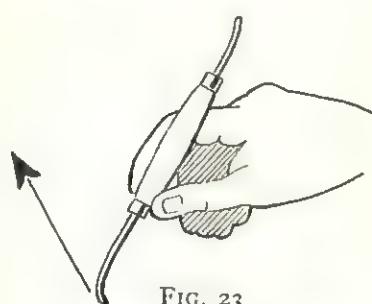


FIG. 23
Method of Holding Tool for
Sinking

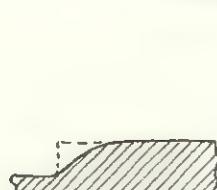


FIG. 24
Rounding the Edge

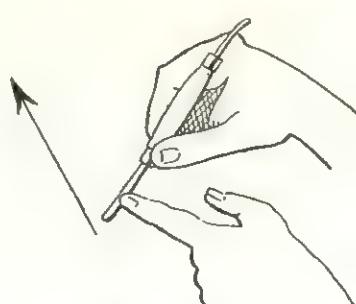


FIG. 25
Method of Holding Tool for
Rounding Edges

Ornamental stones mounted in leather form a simple and effective decoration. Opaque stones in bright colours can be purchased very cheaply. They are mounted by cutting a hole in the leather, slightly smaller than the stone, and fixing the latter behind the hole by seccotining a piece of leather over the back. A more artistic mount may be made by cutting out a simple design (see Fig. 19).

Cleaning Soft Leathers

Every care should be taken to keep seccotine or paste from marking the velvet side of soft leather. Where this does occur, remove immediately with warm water and a clean rag. The pile can be restored by rubbing the leather with a stiff brush when thoroughly dry. Creases may be removed from any soft leather by passing it over a moderately warm iron held upside down.

III. Modelled Leatherwork

The methods used for making up articles in calf or hide are practically the same as those used for soft leather. One difference, however, lies in the making of holes for thonging. In the thicker leathers, a slotting tool is used so that the thongs may lie flat. This tool consists of a punch with three prongs, each of which is the same width as the thongs, and properly spaced for neat thonging. In use the punch is driven through the leather by means of a light hammer. A guiding line is marked near the edges of the leather, as in soft leatherwork. During the punching, the leather is placed face upward on a piece of strawboard, which allows the punch to fully penetrate the leather. After the first three slots have been made, the first of the prongs is inserted in the last existing hole, to ensure even spacing. Care must be taken to see that the slots on individual leathers register one with the other, or thonging will be impossible. Slotting at rounded corners will require care.

Transferring the Design

After the design has been planned out on thin paper, and the leather cut to the size of the

required article, the leather is placed on the zinc plate, face upward, and damped *all over*. The design is then placed accurately over the damped leather and pinned beyond the edges. With a hard pencil trace the design through on to the leather evenly and firmly. The impression on the leather should be clear without being deep enough to interfere with future modelling.

Sinking the Background

Moisten (not wet) the work (the term "work" may now be confined to the design), and, using the broad end of the double-ended modeller, press the leather firmly down all round the outlines of the design. The handle of the tool must be in advance of the point, and directed *along the line to be followed* (Fig. 23). It will be necessary to turn the work continually and the leather should be moistened as often as required. Do not try to work on dry leather. The deepest part of the sinking should be nearest the outline of the design, the rest being graded so that it reaches the upper surface of the leather about $\frac{1}{2}$ in. away from the design. Where small portions of background are enclosed, the whole of that space should be sunk.

When sinking has been completed satisfactorily, the "raised" portion, comprising the design, is ready for surface modelling. This is done with the smaller blade of the modelling tool, the work being damped as required. The surface modelling is not taken to the same depth as the background, and should be as simple as possible. Where it is necessary to round off the edges of the ornament, the modelling tool is held at right angles to the edge and worked gently along it. Figs. 20-25 illustrate fully the type of modelling to be used.

It is well to remember that modelling leathers are prepared to receive and retain impressions. They can be indented by the pressure of even a finger nail. The ornament can be given greater prominence if, when the background has been sunk, the space surrounding it is pricked lightly with a large needle or similar instrument. The necessity would occur when modelling bold designs on modelling sheepskin. If pressure cannot be sufficiently applied to this

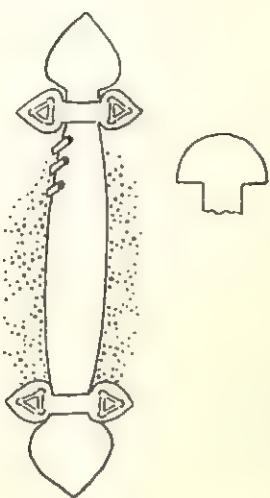


FIG. 26
*Three-Piece Handle
for Pochette*

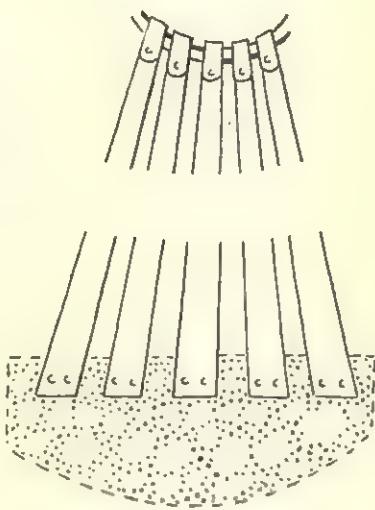


FIG. 27
Radiating Strip Handle

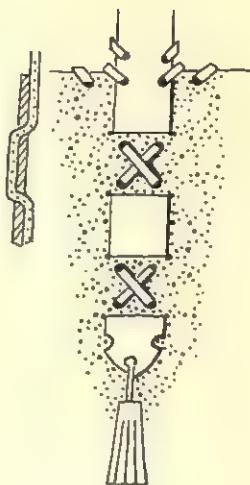


FIG. 28
Laced-in Handle

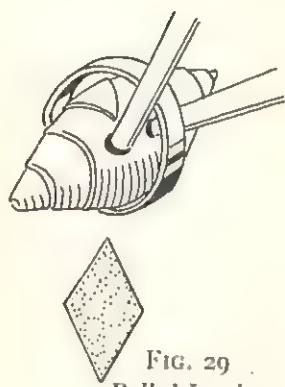


FIG. 29
*Rolled Leather
Fastening*

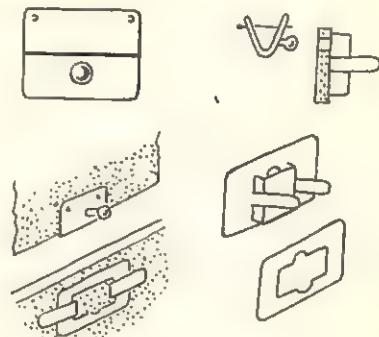


FIG. 30
*Metal Fastening with Method
of Fitting*

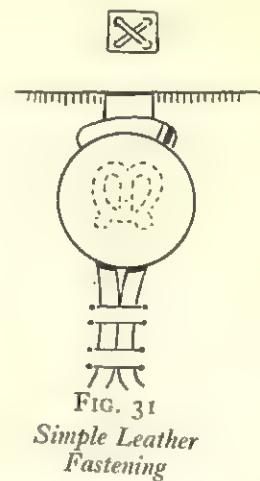


FIG. 31
*Simple Leather
Fastening*

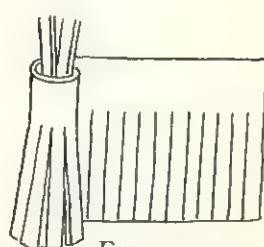


FIG. 32
The Tassel

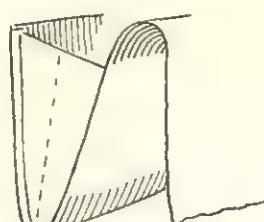


FIG. 33
Simple "V" Gusset

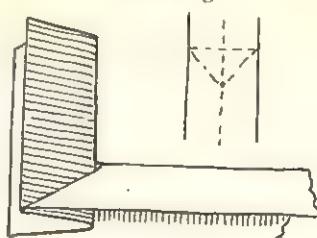


FIG. 34
Folding the Long Gusset

skin the "relief" obtained is but small, so that it requires further treatment to differentiate it from the background. To obtain a greater "relief" the process known as "embossing" should *not* be resorted to: this process consists in forcing the leather up from the back; the bosses so formed will have to be supported, and the method is not one of true leathercraft.

Matting

One of the simplest methods of obtaining ornament is in the use of small punches or "matting tools." A great variety of these punches can be obtained, or, better still from an educational standpoint, they can easily be made by the children themselves. The broad heads of large nails can easily be filed to form some very interesting and original pattern units, which can be used with great effect in combination with straight or curved lines. The impressions are obtained by damping the leather as before, placing the punch in position, and tapping it lightly with the hammer. The caution must be repeated, however, against leaving iron or steel tools resting on the leather. They invariably cause stains which it is very difficult to remove.

The same method can be employed to some extent with soft leathers. The leather is not damped in this instance, and the impressions are more permanent if the punch is slightly heated. This latter would, of course, necessitate the addition of cork or wooden handles, the hammer not being used, but the impressions obtained by hand pressure. The overheating of the tool will scorch or burn the leather, so that it is advisable to test the tool on a piece of scrap leather before use on the finished article. By the use of an inked pad, impressions can first be transferred to paper, thus making certain that the pattern is workable.

The suggestions for nail-head punch patterns given in the illustrations show how easily they can be made, and, although they should be kept as simple as possible in form, it will be seen that there is scope for originality. The surface decoration of the leather should always be done before lining or making up the article.

Colouring

Natural modelling leathers can be coloured by means of stains. These are obtainable in powder form either as a spirit stain or as a water stain. There are quite a variety of colours procurable in spirit stains, whereas in those for water only shades of brown are reliable. It is much easier to obtain evenness of tone with water stains, so that where large surfaces are being dealt with this type of stain is best. Results are obtained much more quickly with spirit stain, but the tendency to streakiness is much greater than with water. If either stain is dealt with in the proper way, there should be very little "messiness" or stained fingers to earn a bad name for the process.

The best method of dealing with spirit stains is to mix them at once in separate medicine bottles about one-quarter full of methylated spirit. This will form a concentrated solution to be diluted with further methylated spirit when required for use. Hot water is used for water stains.

Great care should be taken to see that the leather is quite clean before colouring is begun. The best method of removing grease or dirt before spirit stains are used is to wipe the leather over gently with a wad of cotton-wool which has been dipped in a little methylated spirit. Too much spirit should not be used, as it has a tendency to harden the leather. Warm water is used in conjunction with water stains.

When the stain is being applied, a solution is made from the concentrated liquid in the bottles. This solution should be much lighter in tone than that decided upon for the colour scheme. This will necessitate the laying on of repeated washes, but it is only by doing this that evenness of tone will be secured. The stain is laid on in both instances with a camel-hair brush, this being done while the leather is still damp from the methylated spirit or water used in cleaning. Where the patch of colour in the design is small, the stain may be used fairly strong. To avoid "streakiness" keep the colour moving as far as possible. On large plain surfaces a "wad" can be used. This should be dipped lightly in the stain and worked across the leather in a circular motion.

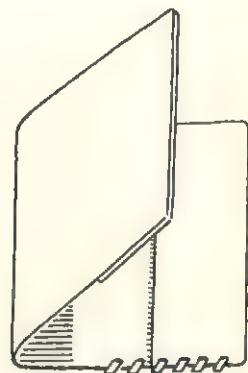
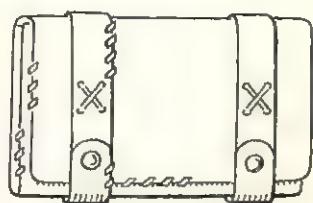


FIG. 35
Pochette and Book Jacket

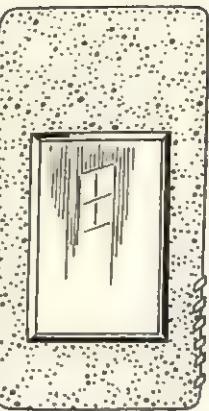
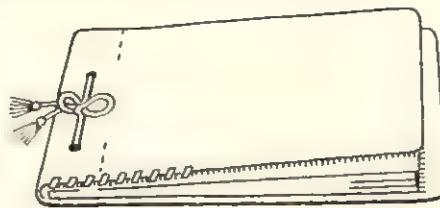


FIG. 36
*Snapshot Album and Mirror-
or Photo-Frame*

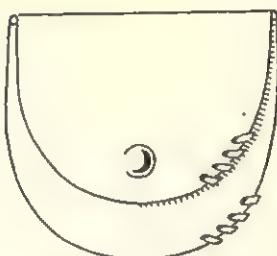
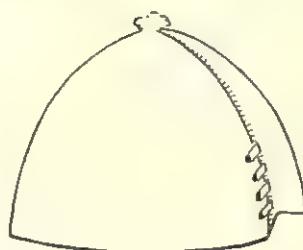


FIG. 37
*Tea Cosy and Tobacco
Pouch*

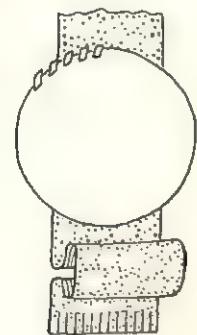
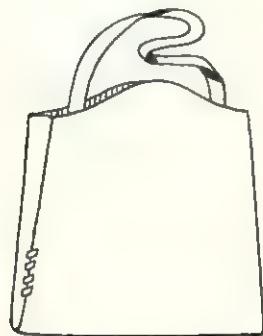


FIG. 38
*Shopping Bag and
Table Runner*

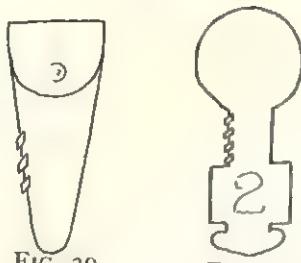
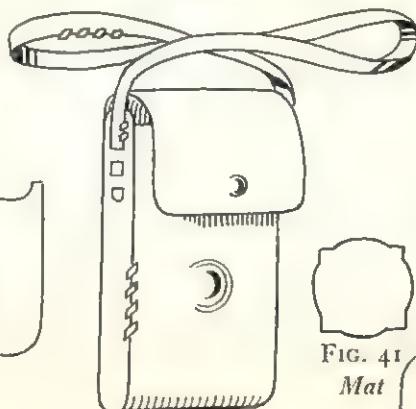


FIG. 39
*Comb Case
and Scissor
Case*

FIG. 40
*Camera Case
and Calendar*

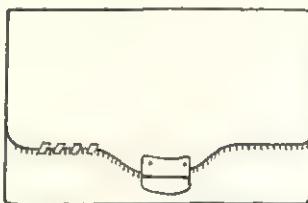


FIG. 41
Mat

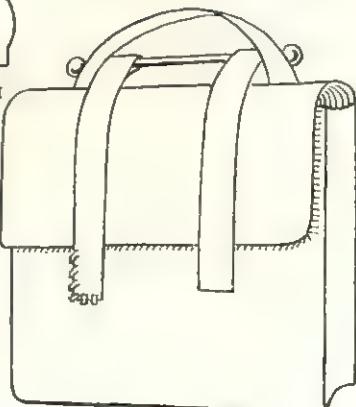


FIG. 42
Hand Bag and Music Case

Suggestions for Articles in Soft Leather (Figs. 35-37) and Modelled Leather (Figs. 38-42)

Natural leather thongs can be stained to any colour by pouring a correct solution of stain into a saucer, holding down each thong in turn with the camel-hair brush in one hand, and drawing it slowly through the liquid with the other; it should then be hung over a strained cord to dry. Where a number of colours are being used in the design, it will be found that a very light tone of the background colour taken over the whole will harmonize the scheme of the design.

The stained surfaces are enhanced by polishing, which is done by rubbing a pad of soft material over the leather for ten to fifteen minutes.

Gussets

There are many ways of making up bag forms, each with its particular type of gusset, which allows it to fold in a certain way or helps in the making of pockets. Two of the simplest only are given, as they are well within the scope of school work.

The first is the "V"-shaped gusset (Fig. 33). This is easily developed, the depth varying with the depth of the bag, and the width of the top of the "V" in accordance with safety when opening the bag. This gusset is folded in the centre.

The second form of gusset is one which extends round three sides of the bag, i.e. two sides and the bottom (Fig. 34). The gusset is cut to the required length and width; it is then folded so that the two long edges meet, with the grain or smooth surface of the leather inside. A definite crease is made. Re-open the leather, and at a point where the corner of the bag would occur, fold the leather back on itself (pile faces touching) so that a transverse crease is formed. Again open the leather and the two creases will be seen at right angles. From the intersection of these, mark off along the long part of the long crease a distance equal to half the transverse crease, and mark a point. From the ends of the transverse crease to this point, form two definite creases by folding grain sides together. Hold nearly flat, with grain side uppermost, and bring the edges of the long portion together as before; also bring the edges of the shorter portion together in a similar manner. If the corner has been creased correctly, the whole

should come together naturally and form a right angle. Repeat the process for the other corner. The practice obtained from a paper pattern will make these processes an easy matter when applied to leather.

All gussets are made from thinner leather than that comprising the main body of the bag. The portions near the edge of a large skin are very suitable for gussets. An alternative method is to use a soft leather similar in colour to the staining of the bag.

Fastenings

All forms of fastening should be fitted to the cut-out leather bag before the lining is pasted on.

The fastening made from rolled leather and thongs has already been described in connection with soft leatherwork. There are many forms of metal fastenings, one of the most popular being the press button.

The press button consists of a "cap," which is usually covered with celluloid, and a "spring stud," both of which are held in position by "eyelets" passed through from the under side of the leather. The buttons are fitted by means of two small punches: the cap and its eyelet by the "positive punch"; the spring and its eyelet by the "negative punch"; both used in conjunction with a small circular die which is hollowed on one side (Fig. 3). Great care must be exercised in determining the positions of the cap and spring. To denote the position of the cap a hole should be pierced through the leather of the flap of the bag. The leather forming the body of the bag should then be folded into position and the flap set truly with the sides and bottom edge. A pin is then pushed through the hole in the flap until it pierces the front portion of the bag. The two holes thus formed mark the position of the centres for the press button. A large hole is then punched in the flap and the cap eyelet is passed through it from the back. The cap is then pressed lightly on the end of the shank of the eyelet on the front of the leather, the leather reversed, and the cap placed in the hollow of the circular die. Place the positive punch in the opening of the eyelet, and, with a light tap from the hammer, weld the two portions together. A small hole is required for

the spring eyelet, which is also pushed through from the back of the leather. After the spring has been placed on the protruding shank of the eyelet, place the leather *face upward* on the flat side of the die, place the negative punch over the spring, and weld as before. Care must be taken to see, especially in soft leatherwork, that the holes made for the eyelets are not too large or the eyelet will not be gripped firmly in the leather. The grips of the spring can be easily regulated: when too tight nip the sections between the jaws of a pair of pincers; when too loose tap the top of the spring gently with the hammer.

The fitting of the clasp is not a difficult matter. The riveting of the upper portion to the flap of the bag requires a little care, the rivets being tapped over at the back while the press button die is used as a support.

With the "lightning fastener," the second type of gusset is used, but instead of being carried round three sides of the bag it extends across the opening as well. This extension is slit along the centre crease to form the opening, and it is to the edges of the opening so formed that the fastener is stitched. The fastener can be obtained in a variety of lengths with either white or brown tapes. The white tapes can be dyed.

These directions for fastenings apply to soft-leatherwork also.

Linings

Stout leather articles are usually lined. This can be done with any material, but probably the best wearing material is the "skiver," a very thin sheepskin, which can be procured in all shades. This is pasted to the body and sides of the article *after* modelling, staining, fastenings, and handles have been completed. A strong flour paste in which a pinch of alum has been dropped forms an excellent adhesive for use with linings.

Making Up

After lining the article, slots are punched for the thongs, great care being exercised to see that the slots register correctly where two parts

fit together. While thonging is in operation, the component parts of the article can be held together in the manner described for soft leatherwork. For the thonging, the edges of the leather can be improved by wrapping a narrow strip of skiver along the whole length of the portion to be thonged. The width of this strip should extend over the edge from the front of the slot to the back of the same slot. This strip should be pasted down.

IV. Soft and Modelled Leathers in Combination

Small panels of modelled leather can be used as appliqué decoration on soft leathers, the combination producing a pleasing effect. The panel is first pasted on the soft leather, and two rows of holes are punched, one set through both leathers just inside the edge of the modelled panel, the other set in the soft leather just outside the same edge. These holes should be placed exactly opposite each other. The edge may then be very effectively thonged with any of the whip stitches previously described (see Fig. 15).

V. General Remarks

Cleanliness is essential to good leatherwork; stains can be removed, but the process invariably leaves its mark. All steel tools used in the work should be wiped thoroughly dry after use. Unused stain should be poured back into the bottle, which should be kept tightly corked. Pumice stone and soap will remove the stains from the fingers. Accuracy is essential for neat work: the constant use of paper patterns will ensure this. All cutting tools should be kept sharp or their use will result in rough edges. Modelling leathers should be rolled up and kept from the light in a cool place; they should never be folded. The latter remark also applies to soft leathers. Scrap leather should be kept, as some use can be made of every tiny bit. Thongs that are not in use should be hung from a nail. This will obviate creases, which will take away from the neatness of what is obviously very decorative work.

VI. Further Suggestions

Although the children should be encouraged to follow out their own ideas in the selection of articles to make, a short list will help to form some idea as to the many and varied uses to which leather can be put—

Book Markers.	Egg Cosies.	Book Carriers.
Spectacle Cleaners.	Serviette Rings.	Mirror Backs.
Comb Cases.	Note Cases.	Pochettes.
Knife Cases.	Season-ticket Holders.	Vanity Bags.
Scissors Cases.	Book Covers.	Shopping Bags.
		Tea Cosies.

Purses.

Small Cushion Covers.

Modelled or stamped leather Finger-plates.
Case for Manicure Set in roll form.

Snap-shot Albums in modelled or soft leather, with loose leaves.

Cases to hold Prayer and Hymn Books in soft or modelled leather.

Tobacco Pouch designed to hold a rubber lining.

Table Runners.

Hand-Bags.

There are many degrees of difficulty in each of the above-mentioned articles, and they should be graded to suit the individual pupil's abilities.

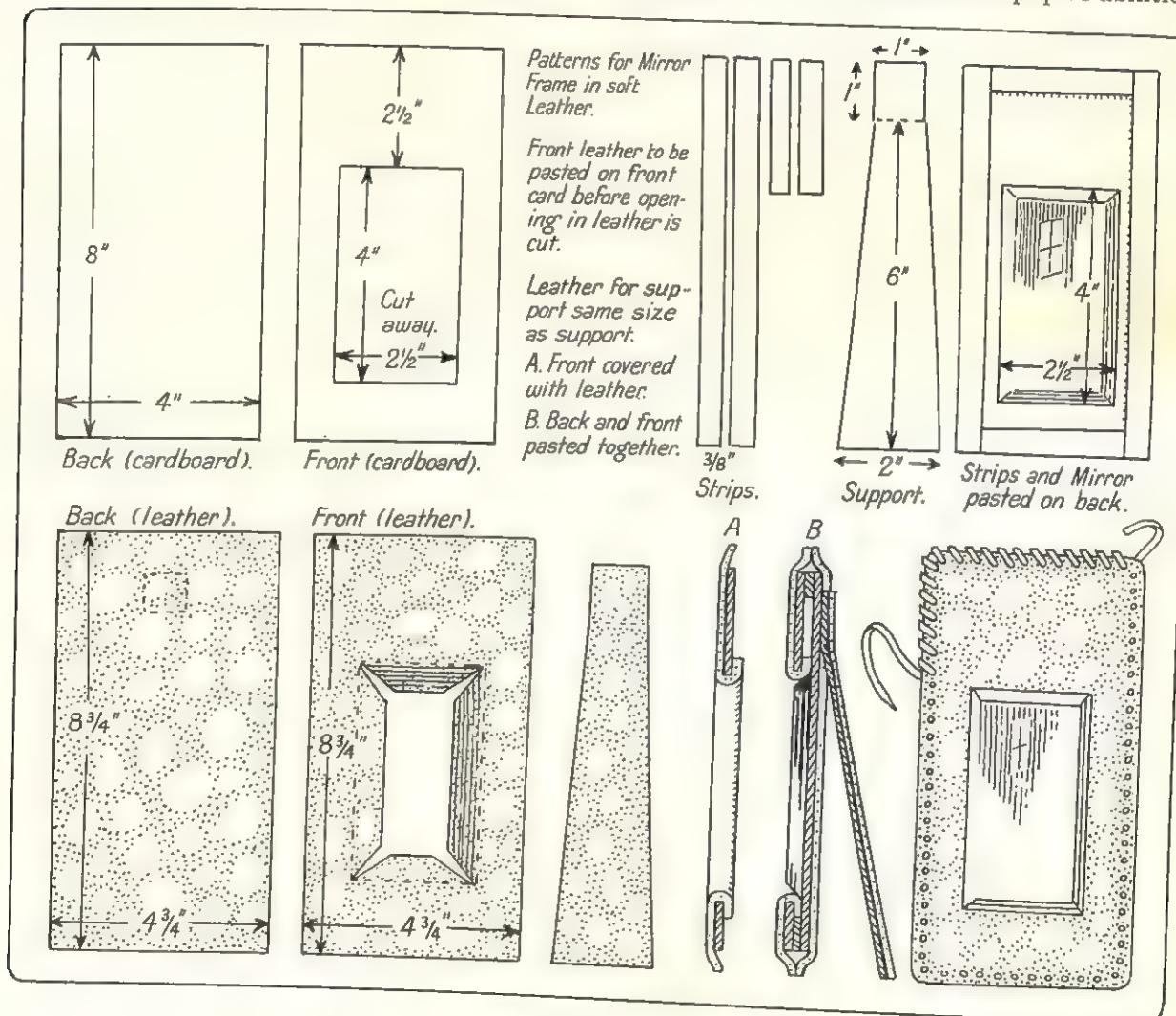


FIG. 43
Development of Patterns for Mirror Frame

THE HANDICRAFT OF WOODWORK

WITHIN the limits of a section of a larger work such as this it would be fruitless to attempt a detailed description of the technical methods used in the handicraft of woodwork as taught in schools. All that can reasonably be attempted is a brief review of the aims of the teaching, together with some description of the methods which have proved, and are still proving, successful in the work of modern Senior Schools.

The teaching of this subject is largely in the hands of specially qualified teachers, who may seek suggestions, not on such matters as the characteristics of a certain timber or the way to manipulate a certain tool, but rather on the way to organize their work, the details of method which are of special importance in the teaching of Senior pupils, and the directions in which their subject may most profitably be developed and co-ordinated with the remainder of the school's activities.

The suggestions here given are therefore such as may be considered of special interest to such teachers. Any who need to learn the actual technique of woodwork can do so only by practice, supervised or at least advised by an expert craftsman and supplemented by the study of a purely technical manual.

The Aims of Handicraft Teaching

It is unnecessary here to enter fully into the many and varied reasons for the inclusion of some form of craftwork in the curriculum of the Senior School. Suffice it to say that modern educational theory holds that the curriculum is incomplete unless it offers some definite opportunities for the pupils to *make things*, thereby catering for that impulse to construct which is the heritage of all children. Such work teaches many "lessons" not found in textbooks and for which other branches of school work offer little scope. It fosters self-reliance, care and accuracy, forethought, and a readiness to undertake tasks which may at times be wearisome in order to

achieve some desired purpose. Moreover, it imparts a reality to many ideas, e.g. of spatial relationships and of the properties of materials, which would otherwise be mere abstractions. Last, but not least, through craftwork can be developed an appreciation of fine workmanship, and the cultivation of an "eye" for everyday things which are fitly designed and well made.

The Value of Woodwork as a School Handicraft

No craft offers better opportunities for achieving these aims than woodwork. Taught in the spirit of "doing fine things in a fine way" (*Sir Percy Nunn*), and not as a sequence of dull exercises from which to derive "lessons" reminiscent of the classroom at its dullest, it can be a notable educational force in a Senior School.

The Equipment of the Workshop

For straightforward woodwork such as is here described a workshop equipped on the usual lines, with single or dual benches, is adequate. One of the ways in which the modern conception of school woodwork differs from the old is in its demand for plenty of storage space for work in progress. This work will often be bulky and a long time in the making, and room must be found for it.

In its equipment of tools the modern wood-work room will differ but little from the old—the traditional tools familiar to every wood-worker will still be needed. A greater number of tools for constructive work than are often supplied will, however, be needed: mortise gauges and chisels, cutting gauges and cramps, must be available for several pupils at one time.

Timber for Woodwork

Recent experience has shown that many hardwoods formerly thought unsuitable for boys to work can be successfully wrought by Senior pupils, with corresponding advantage not only

in variety of texture but in the attractiveness of the finished products.

American, Japanese, and English oaks; English chestnut (a mild-working and very attractive wood of low cost); birch, Honduras mahogany, black walnut, and some of the recently-introduced Empire timbers—all are suitable for school work, especially in the Second- and Third-year courses. Satin walnut and the easily worked but uninteresting American whitewood (or

"Canary" wood) still find favour for early constructive work, while for exercises in the preliminary course yellow (or, as it is sometimes called, red) "deal," which is the trade name for the timber of the northern pine, is cheap, and, if a prime quality is used, reliable. Yellow pine is almost as costly as some hardwoods, and should rarely be necessary unless a very easily worked wood is required for some special exercise with beginners or backward pupils.

THE SCHEME OF WORK

Experience suggests that a three-year scheme of woodwork for Senior scholars should be arranged in two main sections: the Preliminary Course and the Later Work.

I. *The Preliminary Course*

This has as its main aim, *in the eyes of the pupils as well as of the teacher*, the laying of sound foundations of technique. The production of finished articles either of home or of school utility may generally be disregarded in these early stages, since it is rarely possible for beginners, who are concentrating on fine workmanship, to make anything really worth while as an article of permanent value. A satisfactory preliminary course for pupils of normal intelligence must be based upon a sequence of essential tool exercises and joints, and any attempt to turn these into "useful" articles will with a few exceptions lead not only to the production of inartistic trivialities, but also to much waste of time. The wise teacher will therefore waste no energy in trying to devise "applications" for these preliminary exercises. Once the pupils have really mastered them, the field for their application, and for the exercise of the pupil's individual taste and ability, is unbounded; but until this preliminary technique has been acquired the pupils can do little in the way of real creative work.

THE ESSENTIALS OF A PRELIMINARY COURSE

1. The pupils must be taught from the first those methods of tool manipulation which they will have to rely upon in later work, and which would be used by a skilled craftsman. They should never be taught anything which they will later have to "unlearn;" e.g. in positions where cut (not scratched) lines are necessary

for accurate work, there is no justification for allowing a beginner to use pencil lines instead.

2. The pupils should be taught to be critical of the condition of their tools, and sharp edge tools must be used from the first. Not until much later will the pupils be able to keep their own tools in order, and at this stage the teacher must have the sharp tools ready for them.

3. A beginner cannot be expected to work to a ruler accuracy of much closer than $\frac{1}{16}$ in., especially if his rule is graduated only to $\frac{1}{8}$ in. Yet wherever one piece of wood has to be fitted into another he must work to much closer limits, for $\frac{1}{16}$ in. may make the difference between a well-fitting and a loose joint. How, then, is he to attain this standard of accuracy in the early stages? Only by using the craftsman's methods, which minimize the reference to the rule by means of various devices of superimposing and the use of gauges, always working from "face side" and "face edge." The width of a groove to take a certain piece of wood must be marked from the wood it is meant to receive: the slots for a dovetail joint from the tails themselves; the mortise and tenon by gauging each with the same fixed gauge; and so on.

Not only are these methods based upon fundamental geometrical principles (e.g. the Euclidean method of superimposition; the use of "planes of reference" at right angles, etc.), but they are the age-old traditional methods of the craftsman, evolved in a quest for economy of time and effort coupled with fine workmanship. Yet too often one has found in school woodwork rooms teachers who, good craftsmen themselves, have discarded these fine traditional craft methods in the desire to "bring in the use of the rule" because it is "more educational." The truly educational method is to make the pupil as fully cognizant as possible of the realities underlying his work, and as independent as he can be of outside aids with their risk of error.

The rule is essential for determining the general dimensions of the work, but the accuracy demanded by a well-fitting joint cannot be attained, at least by a beginner, by the use of the rule alone.

The Achievements of a Preliminary Course

In from nine to twelve months at most, and generally in less time, a boy of normal intelligence should be able to perform any of the

following operations (given tools in good order) with reasonable accuracy and independence—

(a) Plane a piece of wood measuring anything up to 18 in. \times 6 in. \times 1 in. to width and thickness, and square the ends to length with a tenon saw.

(b) True the end grain of wood up to $\frac{1}{2}$ in. thick with a plane, either on a shooting-board or in the vice.

(c) Use the plane for chamfering and rounding, and

Suggestions for Preliminary Exercises

No two teachers of woodwork will use exactly the same preliminary course, but each will adapt his methods to the special needs of his pupils. The following may be taken as suggestions as to what can be done. The notes upon

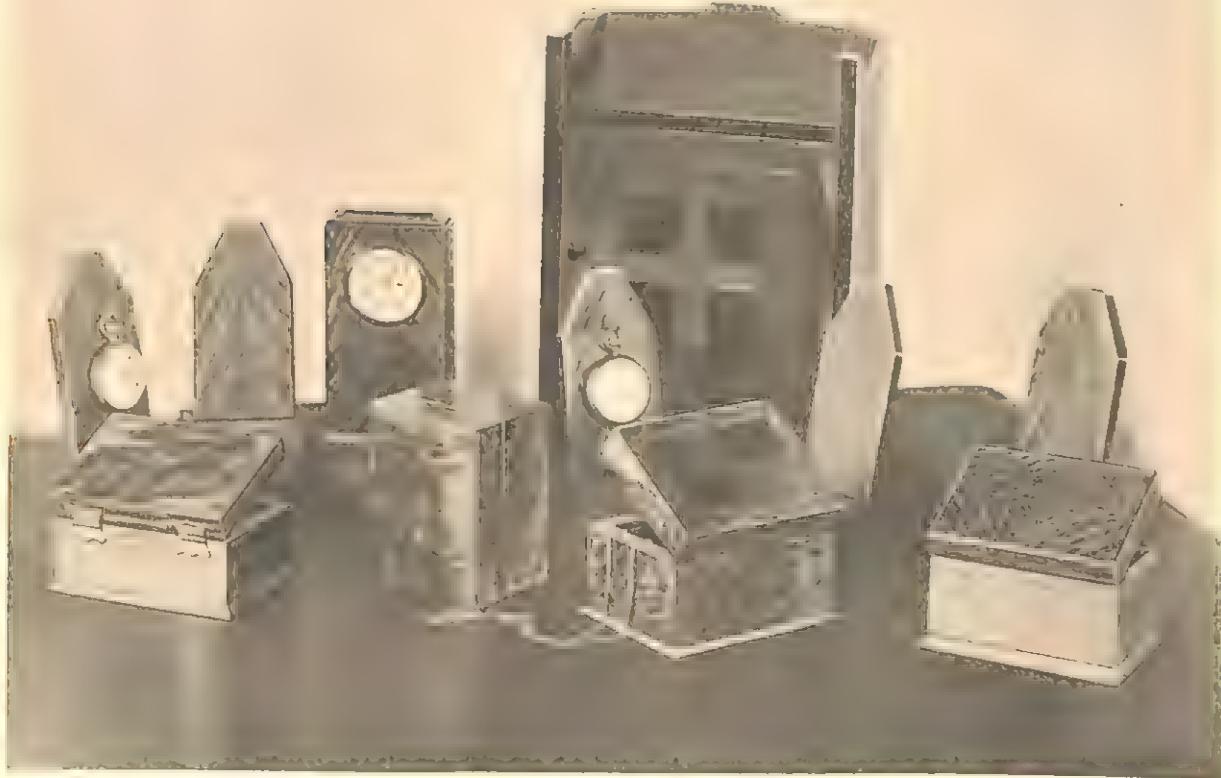


FIG. I

*A Group of Veneered Articles, and a First-Aid Case with Inlaid Panel
From a non-selective Senior School, pupils' ages 11-14.*

the firmer chisel for vertical, horizontal, and oblique paring.

(d) Use miscellaneous tools such as the brace and bit, the bradawl, screwdriver, and hammer; do simple nailing both straight and oblique, and be able to use small wood screws correctly.

(e) Make the following joints: lapped and tee-halving (straight or dovetail); through and stopped housing; plain mortise and tenon without rebate or groove; common dovetail for the corner of a small tray or box.

(f) Be able to read a simple straightforward working drawing, e.g. of any of the above joints.

each exercise refer to the special points upon which emphasis should be laid in order to form correct habits of procedure for later and more independent work.

Accuracy of fitting, the need for which is readily realized by even the dullest pupils, is the main aim of these exercises. Ruler accuracy, and the capacity to make the finished work tally exactly with the drawing, is more difficult to

attain, as the pupils see less need for it. It will come slowly but inevitably if accuracy of fit is first insisted upon.

Economy of time and material will be achieved if these early exercises are designed to be made from the stock of ready-sawn wood which every school workshop should have in hand. 2 in. \times 1 in.; 1½ in. \times ½ in., and 3 in. \times ½ in. are useful sizes of strips. Use good quality red deal, except that for first exercises in

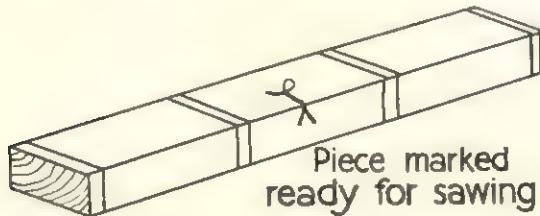


FIG. 2

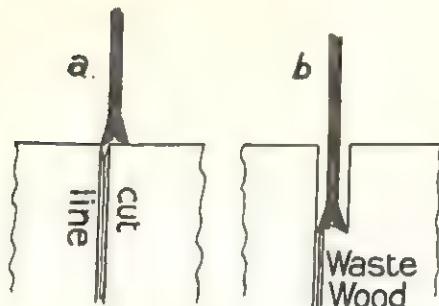
Beginner's Sawing Exercise

FIG. 3

Tenon Saw Cut

trenching, and with backward pupils, the more costly yellow pine may be justifiable.

1. PLANING AND END SAWING

(Fig. 2.) Out of 10 in. \times 2 in. \times 1 in. piece.

No piece of wood for early planing exercises should be less than 10 in. long. Sharp *cut* lines should be used for squaring, and these must be carried all round the wood, i.e. across back and back edge as well as face and face edge. Otherwise the saw cut will have a rough edge on emerging from the underside and back of the cut.

The importance of sawing in the waste wood must be stressed, hence not less than ¼ in. of waste wood must be left between each block.

An enlarged section of a tenon saw cut is shown in Figs. 3a and 3b.

The exercise may be used to produce blocks of various lengths for geometry, science, and other lessons, or may be used to make building blocks in quantities for younger children.

2. TRENCHING EXERCISE

(Fig. 4.) Out of 10 in. \times 2 in. \times 1 in. piece. After planing, the widths of the grooves are

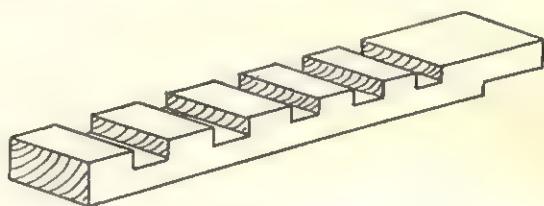


FIG. 4

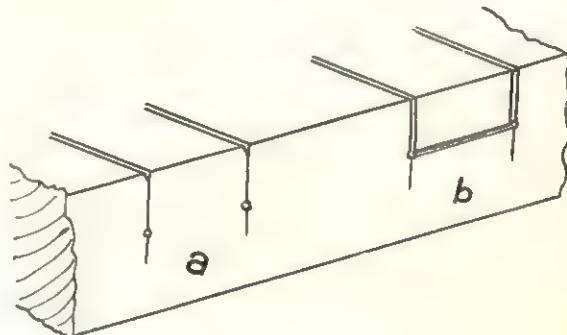
Trenching Exercise

FIG. 5

Gauging for Depth

marked on the face side with *cut* lines. These lines are carried down each side in *pencil*. Then the gauging for depth is done. If the point of the gauge is first pressed into the wood on each pencil line, the pupil will find it easier to start and stop the gauge lines without overrunning (Fig 5a). Lastly the ends of the trenches are marked with *cut* lines over the pencil lines (Fig. 5b).

This exercise contains the first attempt at sawing down the grain—a difficult operation which must be mastered for later joint work. It is as well to let the pupil try this as soon as possible. The three steps in sawing are shown in Fig. 6.

**3A. PARING, BORING, SAWING WITH THE GRAIN,
ETC.**

(Fig. 7.) Out of 10 in. \times 3 in. \times $\frac{1}{2}$ in. piece. This introduces the planing of a wider and thinner piece. The corner at A and the trench at C should be pared vertically; the corner at

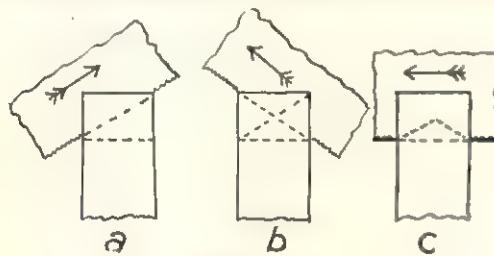


FIG. 6

Three Steps in Sawing Exercise

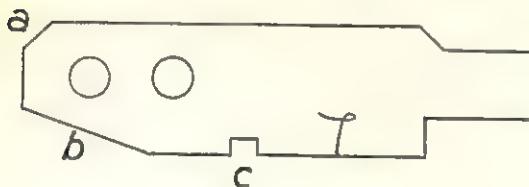


FIG. 7

Paring, Boring, and Sawing with the Grain

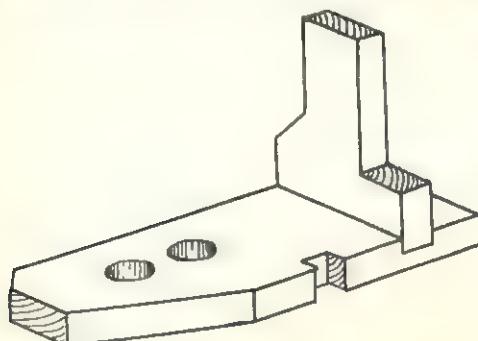


FIG. 8

First Housing Exercise

B sawn outside the line and pared obliquely. The two holes give the pupil a second try at the same operation.

3B. FIRST HOUSING EXERCISE

(Fig. 8.)

The last exercise may for the quicker pupils be used as a first attempt at housing. The steps in marking out a housing joint are as follows—

(a) Cut off piece to be housed in, squaring the end accurately.

(b) Mark one side of the trench with a cut line; stand piece to be housed in position, and with point of marking knife prick the width of the trench (Fig. 9a). Square a cut line across the wood just inside this mark. The correct position of the cut lines for a housing joint is shown in

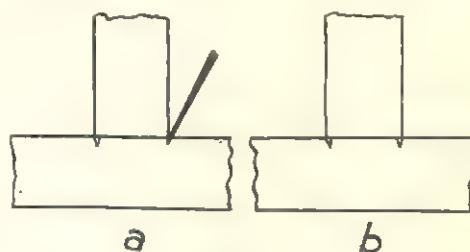


FIG. 9

Steps in Marking Out Housing Joint

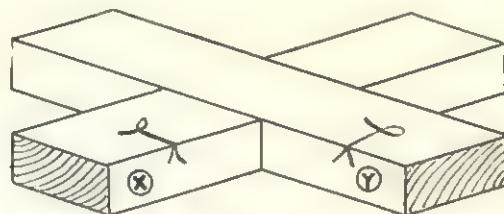


FIG. 10

Lapped Halving Joint

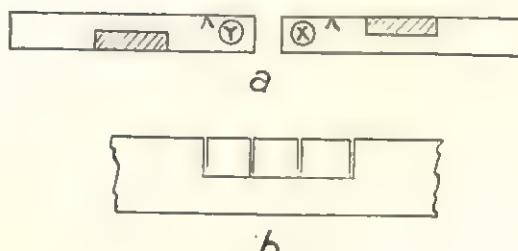


FIG. 11

Steps in Marking Out Halving Joint

Fig. 9b. The marking of the depth of the trench is completed as in Exercise 2.

4. LAPPED HALVING JOINT

(Fig. 10.) Out of 10 in. \times $1\frac{1}{2}$ in. \times $\frac{1}{2}$ in. piece.

The steps in marking out this joint are important—

(a) Put two face marks and face edge marks on the wood while planing the whole length of wood to width and thickness.

(b) Cut each piece to length. On the face of

piece X mark one side of trench; mark width of trench by using the other piece as in previous exercise. Repeat on underside of piece Y.

(c) Mark ends of trenches with pencil lines, and gauge depth of trench *from the face side on both pieces*. Cut lines to depth of trenches (Fig. 11a).

Before paring the trenches, make one or two

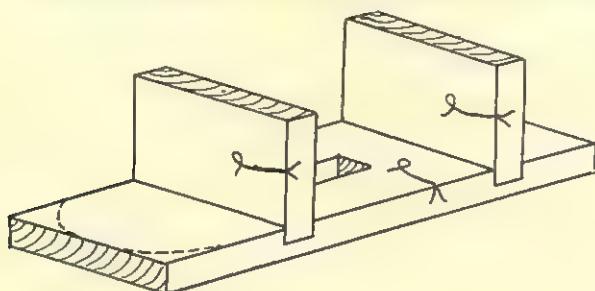


FIG. 12
Through Housing Joint

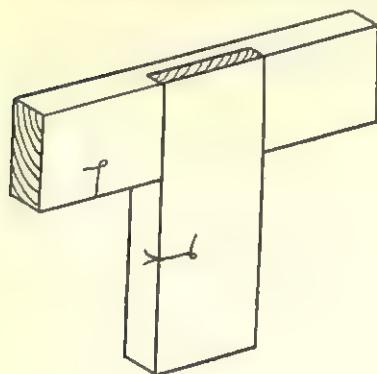


FIG. 13
Tee Halving

saw cuts in the waste wood to facilitate the use of the chisel (Fig. 11b).

Quick pupils may turn this into a saucepan stand or a quoit board, but the essential feature is the joint.

5. THROUGH HOUSING JOINT

(Fig. 12.) Out of 12 in. \times 3 in. \times $\frac{1}{2}$ in. piece.

Two joints are made, to give more practice. Quick pupils may be encouraged to use shooting board to true the ends of the housed pieces, and may round one end (bowsaw and spokeshave) and cut the oblong hole. Here again, however, the important matter is the joint practice.

If really desired by the boys, this exercise can be turned into a doll's stool, but attempts to turn it into a toothbrush rack, pen stand, etc., are not generally worth while.

6. TEE HALVING

(Fig. 13.) Out of 10 in. \times 2 in. \times 1 in. piece.

It is marked similarly to lapped halving. The sawing down the grain is the important feature of this exercise. Quick pupils may practise other

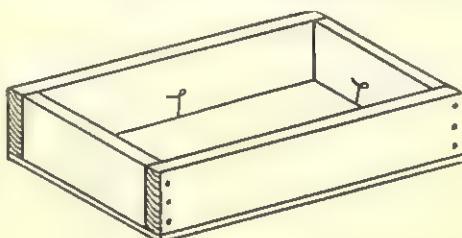


FIG. 14
Nailed Box

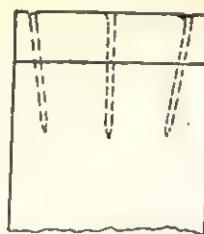


FIG. 15
Nailing the Box

tool exercises, such as paring and chamfering with chisel or plane, on this exercise.

7. NAILED BOX

(Fig. 14.) Out of one piece 10 in. \times 3 in. \times $\frac{5}{8}$ in. ripped down the middle, or it may with advantage be made larger.

This is the first article of real utility in the course, and great care should be taken with the procedure in setting out the four-sided construction.

(a) Plane the two pieces, each one side and one end, to width and thickness, using same gauge settings for both. Make two face-marks on each piece.

(b) Cut the ends and sides roughly to length—at least $\frac{1}{2}$ in. too long should be allowed at this stage.

(c) Put the two sides together in the vice, with face sides together and face edges uppermost, and square cut lines across both pieces in one operation, to mark the exact outside length. Repeat with the two ends.

(d) Square each piece to length with cut lines all round. Saw off within $\frac{1}{16}$ in. of lines, and plane ends true on shooting board. End and

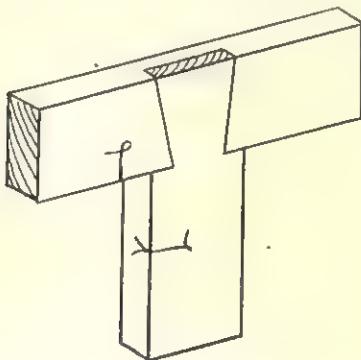


FIG. 16
Dovetail Halving

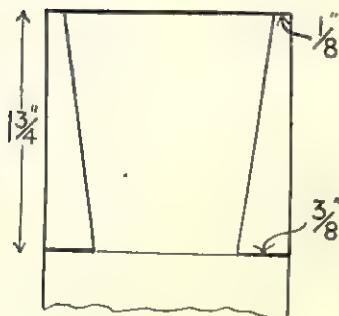


FIG. 17
Setting Out the Tail

side pieces must pair up exactly together when this operation is completed.

(e) Nail as shown in Fig. 15, putting centre nail in first, and then using try-square to get side square to end. The nails should be punched in below the surface.

(f) The bottom may be of three-ply wood, cut to full dimensions, with one side and one end planed at right angles. After the bottom has been nailed on, the other two edges are planed off to the size of the box.

8. DOVETAIL HALVING

(Fig. 16.) Out of 10 in. \times 2 in. \times 1 in. piece. Since the finished width of the wood is $1\frac{3}{4}$ in., a difference of $\frac{1}{2}$ in. in width of tail at top and bottom will give a slope of 1 in 7 each side. Later on, dovetails will be marked with a template or bevel set to a slope of 1 in 7 or 1 in 8, but here direct measurement must be used.

The setting-out of the tail is shown in Fig. 17. The broader end of the tail is made narrower

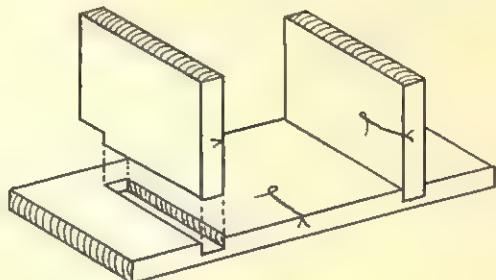


FIG. 18
Stopped Housing

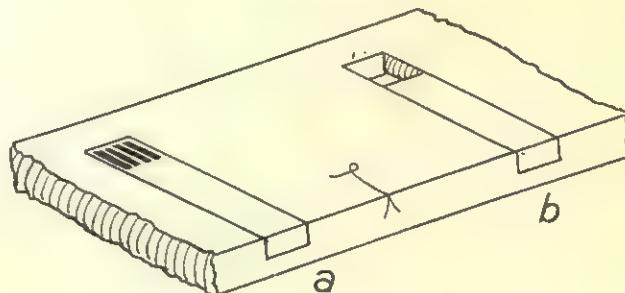


FIG. 19
Marking Trench for Stopped Housing

than the wood in order to make it easier to start the saw. The steps in making are as follows—

(a) Plane up in one piece (2 face marks).

(b) Set out and cut tail portion as for tee halving. Keep the gauge set for the later marking out. Saw the two pieces apart.

(c) Mark the trench width by putting tail in position on the other piece, and making faint lines at each side. Deepen these cut lines, using edge of try-square as straight-edge; then complete the marking of depth of trench as in previous halvings.

(d) Saw and pare trench as in previous exercises.

9. STOPPED HOUSING

(Fig. 18.) Out of 12 in. \times 3 in. \times $\frac{1}{2}$ in. piece.

Two joints are included to give greater practice. The important feature is the cutting of the stopped trench. After the groove is marked, with a $\frac{1}{2}$ in. chisel and mallet make cuts as shown in Fig. 19a, keeping well in the waste wood. Remove the waste with a $\frac{3}{4}$ in.

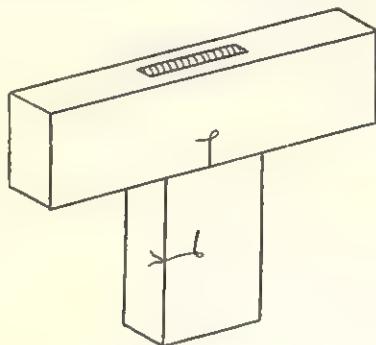


FIG. 20

Through Mortise and Tenon Joint

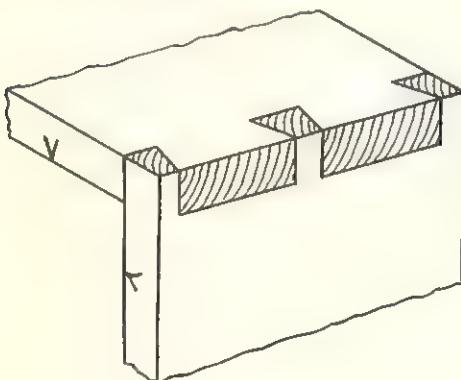


FIG. 21

Common Dovetail Joint

chisel, then trim this slot to exact size back to the cut lines (Fig. 19b). The point of the tenon saw can now be put into this slot, and, by making short strokes at first and gradually lowering the saw. The worker saws the side of the trench. The rest of the waste wood in the trench is then removed by paring.

10. PLAIN THROUGH MORTISE AND TENON JOINT

(Fig. 20.) Out of 10 in. \times 3 in. \times 1 in. piece.

The method of marking and cutting this joint is well known. The special points to be observed are the setting of the mortise gauge to the width of the mortise chisel available, and the leaving of the final trimming of the mortise to length until the bulk of the waste wood is removed. If the mortise is cut back to the cut lines too early, the edges will be certain to be bruised when the waste wood is levered out.

If this joint is properly made, it should not be necessary to pare either the sides of the mortise

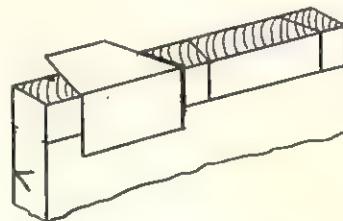


FIG. 22

Marking Pins for Dovetail Joint

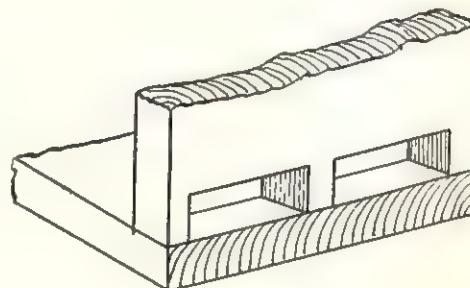


FIG. 23

Tails Ready for Marking

or the faces of the tenon to make them fit together.

11. COMMON DOVETAIL JOINT

(Fig. 21.) Out of 10 in. \times 3 in. \times $\frac{1}{2}$ in. piece.

Some teachers may prefer to leave this joint to be done later, after some definite constructive work has been attempted, but it should certainly be mastered before the middle of the second year because of its fundamental importance in box and carcase construction.

The design of the joint is important; the slope of the tails should not be more than 1 in 6, and preferably 1 in 8 for hardwood; and half

pins, not half tails, should be left at the outer edges.

Great care must be taken to teach correct methods of setting out and cutting. The following method, which has the weight of traditional usage behind it, will be found successful with boys. The alternative method of setting out—from the tails, using the point of the tenon saw—is difficult for young pupils, especially in view of the likelihood of the point of the saw being defective or bent through rough usage in the workshop.

The steps are as follows—

(a) Plane wood to width and thickness in one length. (Two face marks.) Cut the wood in two.

(b) Square round one end of each piece with cut lines, and true ends on shooting board.

(c) Set a *cutting gauge* (which must be sharp) to the exact thickness of the wood, and gauge across each of the squared ends, running the stock of the gauge on the newly shot end.

(d) Mark the widths of pins and half-pins on the end of one piece.

(e) Make a dovetail template from stiff paper or a postcard, or (better still) of sheet tin, with a slope of 1 in 8; cut to shape, bend, and use it to mark the pins as shown in Fig. 22.

(f) Saw the edges of the pins, sawing on the waste-wood side of the lines.

(g) Using a bowsaw, remove most of the waste wood between the pins; then pare back carefully to the cut gauge line.

(h) Stand pins in position on the other piece (Fig. 23), and with a sharp pencil or pointed scriber mark round the ends of the pins. Square the lines for the tails across the end of the wood and at the shoulders.

(i) Saw the tails, keeping to the waste-wood side of the lines. Cut out the wood between the tails, using a narrow chisel and mallet; and saw the shoulders.

The joint should now fit sweetly when driven together with light blows of the mallet, or with a hammer and a block of wood.

II. *The Later Work*

Once the pupil has mastered the essentials of the preliminary course, his progress towards the independent exercise of his powers in the construction of really useful and attractive articles

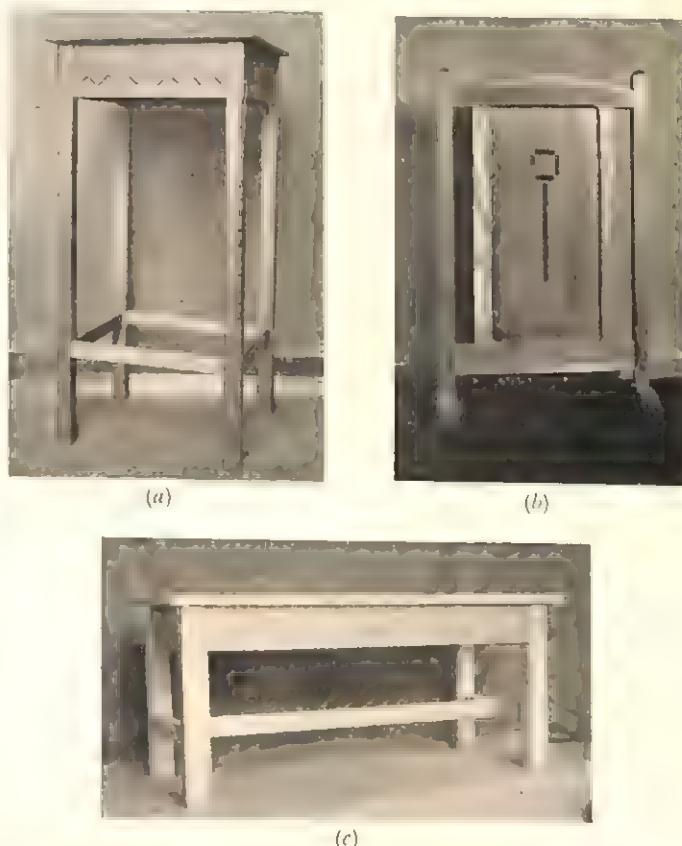


FIG. 24

Second-Year Work

- (a) Occasional Table (birch).
- (b) Fire-screen (oak inlaid with padouk).
- (c) Stool (chestnut).

From a non-selective Senior Boys' School.

may be very rapid. The teacher should not, however, fall into the common error of acting as if his only function at this stage is to supervise the pupils' attempts at work of their own choice. If progress is to be consistently maintained much definite instruction must still be given in certain fundamental types of constructions, and in suitable decorative processes. The difference between the preliminary and the subsequent work is, essentially, that in the latter there

is wide scope for variety, it may be at the choice of the pupils, within the limits imposed by the particular form of construction being practised.

mirror held in rebates, or with panels held in grooves. These frames may or may not be decorated with various forms of chamfers or mouldings.



FIG. 25
A Group of Second- and Third-Year Work
All made in oak.
From a non-selective Senior Boys' School.

The Fundamental Types of Constructions

Practically all woodwork of which Senior pupils are capable (and it covers a very wide field indeed) involves one or more of the following types of constructions—

Carcases or Boxes: jointed with housing, common dovetail, lapped dovetail, or secret dovetail joints. The traditional form of drawer construction is a special example of this type.

Flat Frames: jointed with mortise and tenon joints, without panels, or with panels, glass, or

Stool or Table Constructions: consisting of legs held together by lateral rails jointed with mortise and tenon joints, with or without stretcher rails.

There is hardly any piece of woodwork likely to be made by the pupils which will not fall under one, or a combination of two or more, of these three headings.

The aim of the later course should therefore be to introduce these fundamental constructions, allowing the utmost possible variety of design among the pupils in a class or group.

Notes on the Standard Constructions

In the following notes on the later scheme the fundamental forms of construction are introduced in an approximate order of difficulty, which may, however, be varied somewhat according to the needs of the pupils. Some of the important points to be observed in each type are touched upon, and an indication is given of the variety of work which may be attempted without departing from the essentials of each construction. Many incidental processes, such as the use of screws, the making of rubbed joints, chamfering, rounding, and methods of surface decoration, may of course be used to increase the variety of designs, in so far as they are within the capabilities of the pupils.

1. THE HOUSED BOX OR CARCASE.

Fig. 27 shows examples of this type: tea tray, open box, box with "boxed" lid (the box made as a whole and the lid afterwards sawn off); knife box with divisions; simple bookshelves; carcase for medicine chest or small cabinet, of which the door will be made at a later stage of the course.

Early practice in the making of housing joints and of the nailed box will have prepared for this construction. The marking of sides and ends in pairs, face sides inward and face edges uppermost, is most important. Through or stopped housings may be adopted according to the abilities of the pupil and the needs of the design.

2. THE FLAT FRAME WITHOUT REBATES OR GROOVES

Fig. 28 shows examples of this type: a simple soft-wood frame suitable for meat-safe sides or doors, or for a seat frame to be upholstered; a hat and coat rack; a fire screen; a clothes horse. The construction is suitable also for ends of cots or small bedsteads, and for the framed back of a lounge chair of the "Morris Chair" type.

A most important feature in this construction is the method of setting-out—the method to be adopted in all framing, of whatever complexity. The wood having been planed to width and thickness, the two "stiles" (or pieces which will be mortised) are placed together in the vice with

face sides together and face edges uppermost. Across them are squared two cut lines indicating the "sight size" of the frame—i.e. the length of the opening in the frame (Fig. 29a). From these sight size lines the positions and lengths of the mortises are measured outwards, leaving a

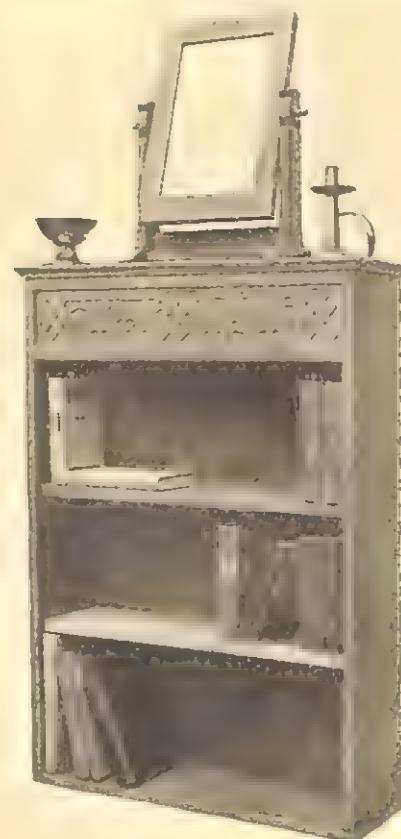


FIG. 26
Third-Year Work
*Oak bookshelves with carved rail.
Oak Toilet Mirror.*
From a non-selective Senior Boys' School.

"horn" of waste wood projecting at each end, only to be cut off after the frame is glued up. (This is true only if the frame is to be a plain rectangle. If it is to form a fire-screen or a clothes-horse it may have projecting "horns" as part of its design.) The stiles are then removed from the vice, and the mortises gauged from the face sides with a mortise gauge. If the

frame is to have one or more "muntins," i.e. tenoned pieces between the rails, as in the hat rack, these should be placed in the vice along

is also the line for the shoulders of the tenons. The overall length of the tenon being marked (Fig. 29b), the rails are taken out of the vice and

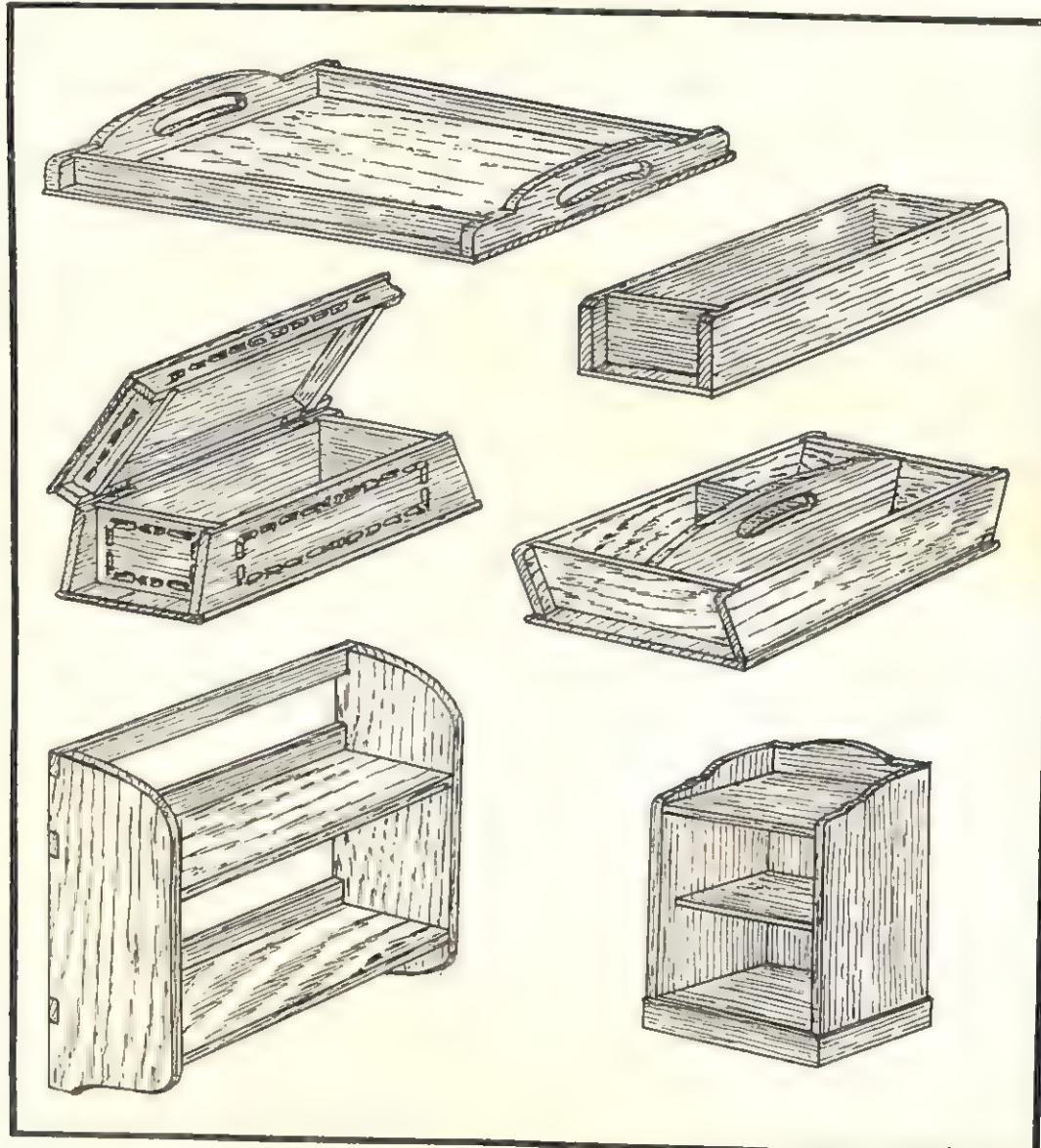


FIG. 27
Examples of Housed Box or Carcase

with the stiles and the sight size lines marked across them also.

Similarly the rails—the tenoned lateral pieces—are marked in pairs with the sight size, which

cut to length. The shoulder lines are carried round the wood with cut lines, the width of the tenons being marked from the face edge with a marking gauge, and the thickness of the tenons

being marked from the face side with a mortise gauge.

3. THE FLAT FRAME WITH A PANEL OR MIRROR

This construction is especially applicable to the making of a simple single-panelled door to

setting-out is similar to that of Type Construction 2. If the wood is inclined to be cross-grained it will be wise to gauge along the full length of the ploughed grooves (which must be exactly equal to the thickness of the mortises) in order to get clean edges for the grooves. The mortises and

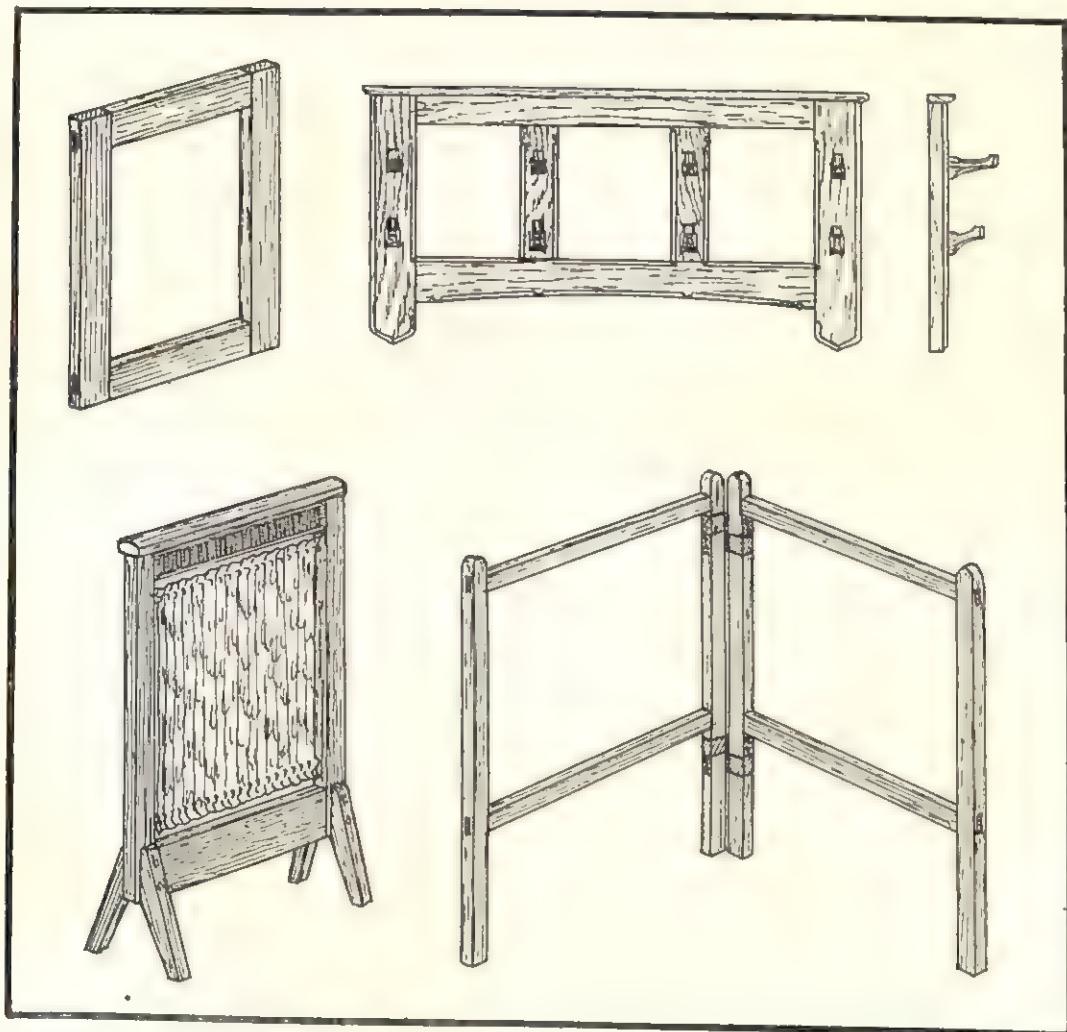


FIG. 28
The Flat Frame Without Rebates or Grooves

complete the medicine chest or simple cabinet made as an example of the first type of construction. Probably the easiest type of panelled frame for young pupils to make, if a good plough plane is available, is that with a ploughed groove. The joint for this is shown in Fig. 30. The

tenons, but not the shoulders, are cut *before* the grooves are ploughed. The panel must, of course, be inserted before the gluing up.

For a mirror or glass sheet a rebated frame *must* be used, and many will prefer to insert wood panels in a rebate. The soundest simple

rebated joint is that known as the "long and short shoulder" mortise and tenon joint shown in Fig. 31. The setting-out of this is apt to confuse young pupils unless very carefully demonstrated and supervised. That for the stiles is shown in Fig. 32a, and for the rails in

the fire-screen in Fig. 24, and in the mirror frames and cabinet doors in Fig. 25.

4. THE STOOL OR TABLE CONSTRUCTION

Primarily applicable to stools and small tables, this construction is also useful for stands

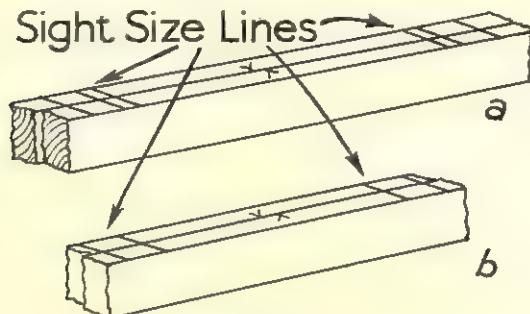


FIG. 29
"Sight Size" of Frame

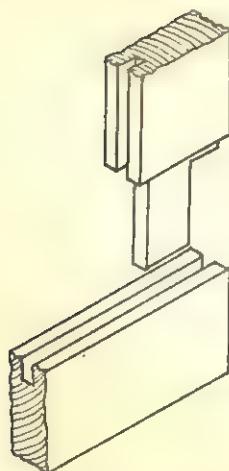


FIG. 30
Joint for
Ploughed
Groove

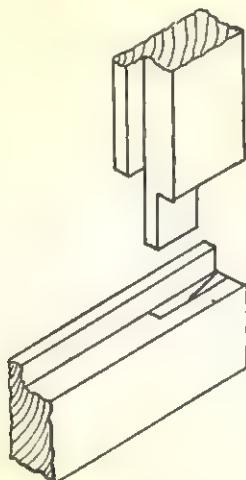


FIG. 31
"Long and Short
Shoulder" Mortise
and Tenon Joint

Fig. 32b. The mortises and tenons are cut before the rebates are made.

A simpler method of constructing a rebated frame is shown in Fig. 33. The frame is first made with a ploughed groove, and, before the gluing up, the ridge which forms the back of the groove is cut away to make the rebate.

Fig. 34 shows two types of mirror frames which are examples of this construction. Further instances of its application are seen in

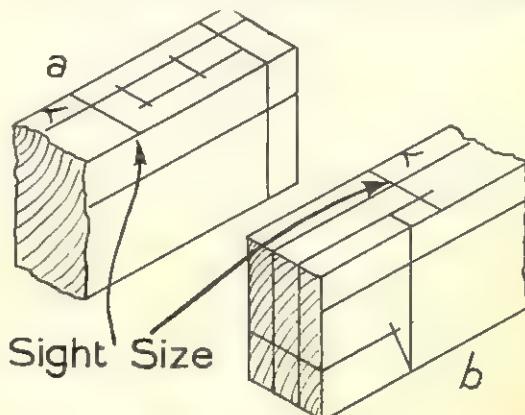


FIG. 32
Setting Out Stiles and Rails

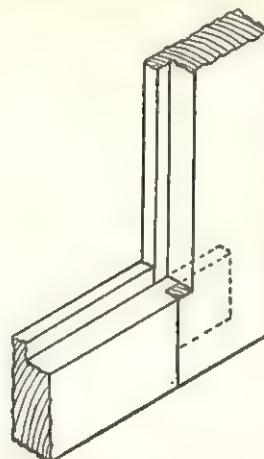


FIG. 33
Simple Rebated Frame

of various kinds e.g. for wireless or gramophone cabinets, work tables, and umbrella stands.

The joint between rails and legs is shown in Fig. 35. Bevelled haunches should be used for the tenons unless the leg is stout enough not to be unduly weakened by the grooves for straight haunches. The width of the mortises on the legs should be marked by putting all four legs together in a vice or cramp, and striking

lines across them. Similarly, the rails should be set out in pairs.

Examples of this construction are seen in Fig. 24*a* and *c*, and in Fig. 25, in the form of plain stools, stools with stretchers, and small

portance in woodwork. Many applications of the common dovetail joint, in the form of boxes with lids, knife boxes, trays, etc., will suggest themselves to the teacher. A plain dovetailed box is seen in Fig. 25, and several with "boxed"

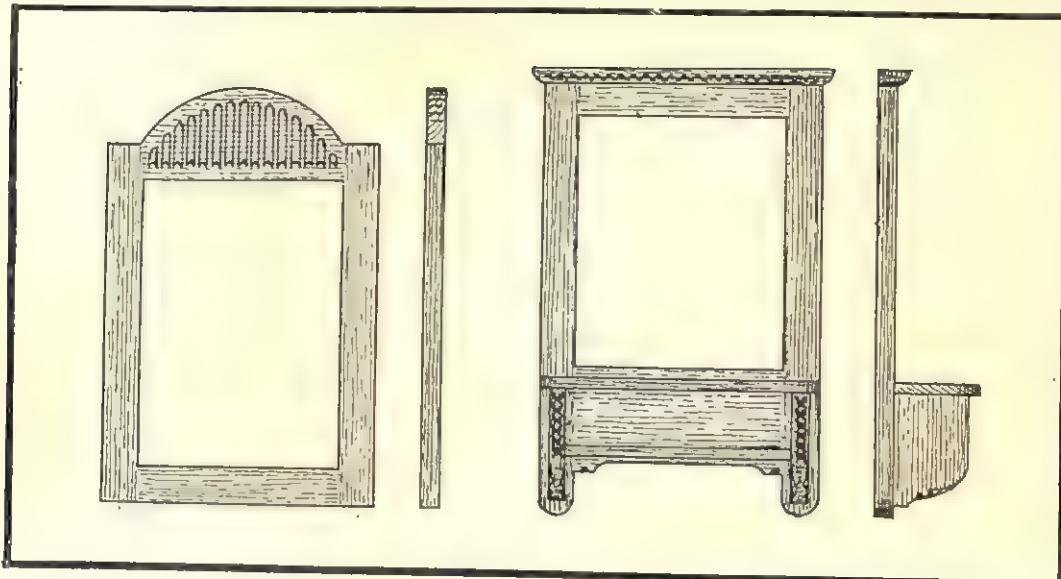


FIG. 34
Two Types of Rebated Mirror Frames

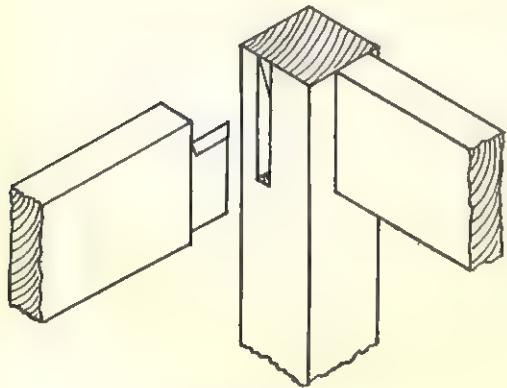


FIG. 35

Joint Between Rails and Leg

tables. Tables, unless designed with short and stout legs, are best made with stretcher rails to stiffen the construction.

5. THE DOVETAILED BOX OR CARCASE CONSTRUCTION

This construction is placed last in order of difficulty, but is perhaps first in order of im-

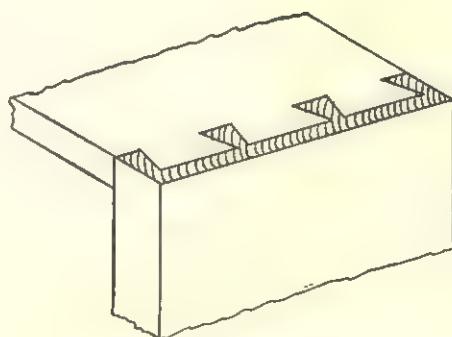


FIG. 36
Lapped Dovetail Joint

lids, afterwards veneered, in Fig. 1. The making of such a box, once the joint has been mastered, involves no new principle, but the setting out of the sides and ends in pairs, as in other constructions, is of great importance. The pieces should be planed accurately to length before setting out the joints.

The lapped dovetail joint (Fig. 36) has as its

principal applications the joints between side and front of a drawer, and between the top or bottom of a carcase and the sides. In either case the joint is not seen from the "lapped" side, hence its suitability in these positions.

Fig. 37 shows the use of lapped dovetails in the making of a small cabinet carcase. A separate top will afterwards be screwed on through the lateral rails. Note the rebate for the back of the carcase.

The Photographs of Finished Work

Other finished articles besides those already referred to are shown in the photographs, all of

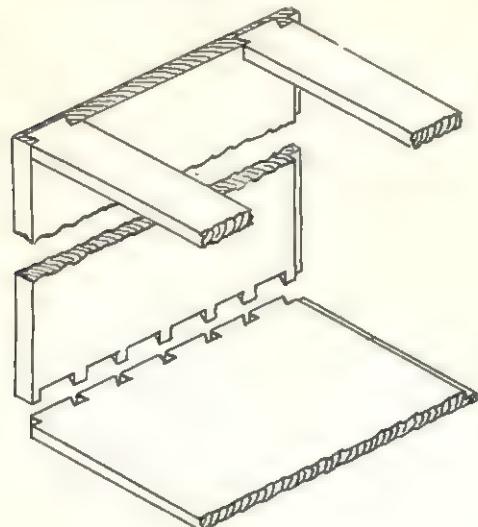


FIG. 37
Use of Lapped Dovetails

which are of work done by boys, either individually or collectively, in the normal course of their handicraft in non-selective Senior Schools.

Decorative Processes

Space does not permit of a description of the decorative processes which can successfully be included in a woodwork course, but applications of some of them are to be seen in Figs. 24a and 24c (Tool-cut Decoration), Fig. 26 (Simple Low-relief Carving); Fig. 24b and Fig. 1 (Inlaying and Veneering). Veneering, providing that it is used as a decorative process to display beautiful woods in a way in which they could not be

used constructionally, offers a wide and little-explored field for school handicraft. Small articles should be chosen for this form of decoration, as veneering large surfaces is a very difficult process for young pupils. Parcels of assorted "scrap" veneer can be cheaply obtained from veneer merchants.

The Problems of Drawing and Design

The making of accurate preliminary drawings is essential to progress in woodwork, but they should definitely be *working* drawings, showing only those details necessary to carry out the work. Thus sections, drawings of one-half only of symmetrical articles, and enlarged details of complicated parts, are often better (because they are more useful and take less time to draw) than the more presentable complete plans and elevations, with every part carefully "grained in," that one has sometimes seen in school handicraft workshops. Full-size sections, drawn on any cheap white or brown paper or on plywood, are workmanlike aids to accurate construction which should be fully used during the course.

If, as is now generally admitted, one function of a school handicraft course is to develop a taste for simple and fitly-designed articles, a good deal of guidance must be given to the pupils in the early stages. Only gradually will they be able to exercise their own individuality: first in the selection and devising of suitable decoration within the limits of the process being taught; later in variations in constructive details. It is absurd to expect inexperienced scholars to make original designs when the most that the average adult (including the handicraft teacher) can do is to select and adapt to his own purpose various details from the mass of well-designed work he has already seen. Thus it is of the first importance that the workshop should everywhere exhibit evidences of well-designed articles. Much must of necessity be in the form of pictures. A collection should be made of illustrations from periodicals; from the lists and folders of firms which make simple and plain furniture; and from the catalogues of museums, especially those which illustrate early English woodwork. A selection of these illustrations should always

be on view, and frequently changed. From them the boys will gain ideas not only of the general appearance of well-designed articles but also of simple forms of decoration which they may adapt to their own purposes. Talks by the

refer for information on tools, timbers, processes, constructional details, methods of wood finishing, and all the hundred-and-one items of "workshop information" which may be needed from time to time.



FIG. 38

Communal Work: a Head Master's Chair in Oak

*The chair when in use has a leather cushion
made by the girls of the school.*

**FROM A NON-SELECTIVE SENIOR SCHOOL,
PUPILS AGE 12-14 YEARS**

teacher on pictures which are specially appropriate to the work in hand will enhance the value of the collection.

The Handicraft Reference Library

This is also essential, and may include books containing good suggestions on design to supplement the displayed illustrations. In addition there should be books to which the pupils can



FIG. 39

Communal Work: A Working Spinning-wheel

*This is used in the school textile crafts by the
girls.*

FROM A NON-SELECTIVE SENIOR SCHOOL

Handicraft and the Rest of the Curriculum

In a well-arranged Senior School, handicraft should be by no means an isolated stream of activity. The craftsman has always played an important part in the progress of civilization, and even to-day, when methods of production have so vastly changed, the "makers" form a considerable part of the world's population.

The obvious contact between handicraft and history lies not in the making of models of such things as Norman Castles, useful as these may be, but in the history of the craft itself, and in the light that the works of the craftsman through the ages can throw upon the condition of the times. Of prehistoric peoples we know little or nothing except through their handicrafts, and in these we see the beginnings of the tools and machines of to-day. The school workshop, making use as it should of the traditions of its craft, can supply much information and illustration for such a study, and for a further survey of the crafts in later days.

In literature the references, few as these may be, to craftsmen and their work, and the bio-

graphics of great "makers," should not be neglected.

The study of science and mathematics may derive much of its material—its "starting-points"—from workshop experiences, especially in matters of calculation, mensuration, geometry and mechanics. The origins of the craftsman's materials are of importance in the study of geography, while art, in so far as it is concerned with design, must maintain a close contact with the realities of the finished product. Indeed, it may be said that there are few subjects with which handicraft may not profitably co-operate at one time or another, either in the making of special apparatus for school work, or, what is more important, in the community of ideas.

METALWORK

Metals

METALS are usually divided into two classes—

1. THE NOBLE METALS: those that resist the action of acids and the oxidizing effects of the atmosphere. These metals are rare and thus expensive. Among the members of this group are gold, platinum, iridium, osmium, vanadium, and molybdenum.

2. THE COMMON METALS, so called on account of the fact that they are widely distributed, cheap, and in general use by civilized peoples. Among the metals of this group are iron, copper, tin, lead, zinc, nickel, aluminium, tungsten, chromium, antimony, and bismuth. The common metals are again sub-divided into two groups—those containing iron are known as the *ferrous metals*, and the remainder as the *non-ferrous metals*. Occasionally the latter are called alloy metals, owing to the fact that the metals of this group are often mixed to form alloys.

The common metals are not usually found in the native state, although there are a few deposits of native copper of doubtful purity in various parts of the world,

and minute specks of native iron are found in most rocky countries, but both of these are only interesting from the scientific or laboratory point of view.

The metals of commerce are derived from ores which consist of the metal combined with some other elements such as oxygen, hydrogen, sulphur, and carbon.

Metals are usually abstracted from the ore by heat treatment.

Fig. I shows the principal metallic ores and their sources, but it must be remembered that, strictly speaking, the common metals are found all over the globe. For instance, it is said that one or the other of the iron ores can be found in every country, but the important point is whether the quantity and purity of the ore, together with the proximity of suitable fuel, make smelting a commercial proposition.

TABLE OF THE PRINCIPAL ORES OF THE COMMON METALS AND THEIR LOCATION

Metal	Ore	Symbol	Districts where Found	Notes
IRON	Hematite . . .	Fe ₂ O ₃ . . .	Cumberland, Lancashire, Germany, U.S.A.	70% iron
	Limonite or Brown Hematite . . .	2 Fe ₂ O ₃ + 3 H ₂ O . . .	Northampton, Durham, France, Germany, Spain, Canada, U.S.A.	60% iron
	Magnetite . . .	Fe ₃ O ₄ . . .	Norway, Sweden, U.S.A., Canada	72% iron
COPPER	Cuprite . . .	Cu ₂ O . . .	Cornwall, Australia, U.S.A.	57% copper
	Malachite . . .	CuCO ₃ . . .	France, U.S.A., Siberia, Australia	50% copper
TIN	Copper pyrites . . .	Cu ₂ S + Fe ₂ S ₃ . . .	Devon, Cornwall, Siberia, U.S.A., Sweden	30% copper, 30% iron, 40% sulphur. Principal British ore of copper
			{ Devon, Cornwall, Malay, South America	Specific gravity, 6.5 to 7.0
LEAD	Tinstone . . .	SnO ₂ . . .	{ Devon, Cornwall, Derbyshire, North Wales, Australia, Mexico, U.S.A.	85% lead
ZINC	Galena . . .	PbS . . .	{ North Wales, Derbyshire, Isle of Man, Cumberland, Cornwall, U.S.A., Belgium, Australia	67% zinc, 33% sulphur
NICKEL ALUMINIUM	Blende . . .	ZnS . . .	Canada	4% nickel
	Pentlandite . . .	(FeNi)S . . .	U.S.A., Canada, Germany, France	40% aluminium
	Bauxite . . .	Al ₂ O ₃ + 2 H ₂ O . . .		

FIG. I
Metallic Ores and their Sources

The Manufacture of the Common Metals

THE FERROUS METALS

IRON. The modern method of obtaining iron from its ore is by means of smelting in a blast furnace. These furnaces are about 25 ft. in external diameter and about 100 ft. high, the present-day tendency being to increase the size.

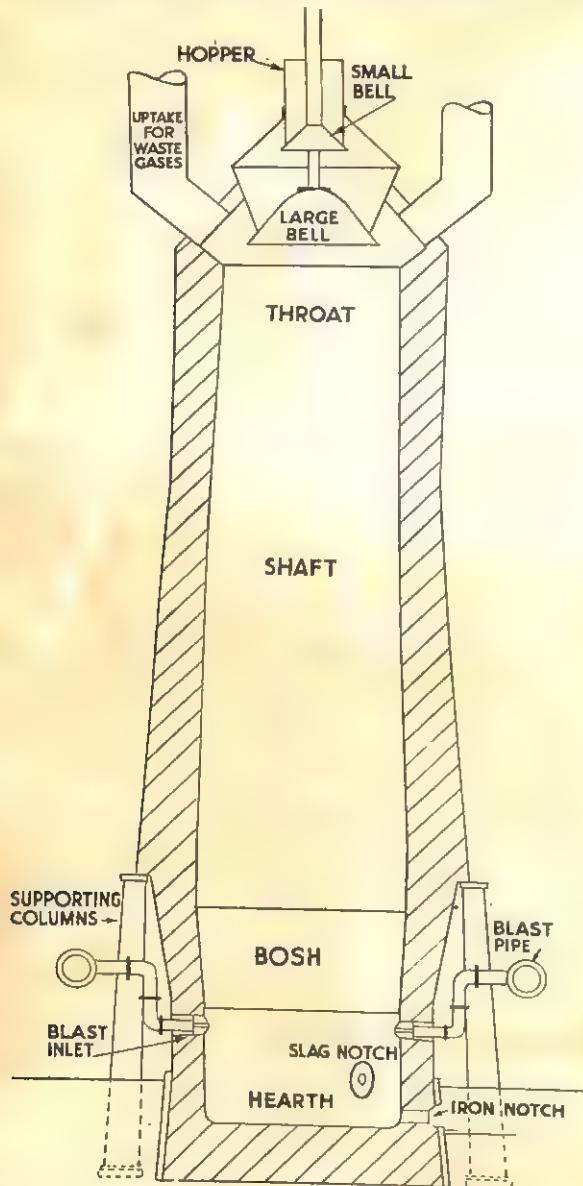


FIG. 2

Section of a Blast Furnace

PIG IRON

The furnace is charged with alternate loads of hard coke and ore, both intermixed with limestone. The blast is forced through the furnace by blowing engines, the air being pre-heated to a high temperature by means of the waste gases from the furnace. This hot blast effects a considerable saving in the cost of production, and is also the means of the furnace yielding a much better quality iron than with a cold blast, which was used in the early days of the industry. The burning coke heats the ore and limestone, and as it drops down the furnace the heat becomes sufficient to melt the waste matter in the ore (called gangue) and limestone. The two latter combine to form a fusible slag, while the iron combines with some of the carbon in the coke, and, by the time the bottom of the furnace (called the bosh) is reached, the liquid iron collects on the hearth with the lighter slag floating on the top. This slag is drawn off from time to time; and when sufficient iron has collected, the furnace is tapped and the liquid iron allowed to flow along a channel cut in sand. This channel is called a sow, and from it at right angles are a number of smaller channels called pigs, into which the liquid iron eventually arrives. This product is known as pig iron, which is really iron in the first stage of refining.

CAST IRON

When pig iron is remelted and cast into some useful shape it is called cast iron, but it should be clearly understood that pig iron and cast iron are both physically and chemically the same metal. Cast iron has a crystalline structure and consists of approximately 95 per cent iron and 5 per cent carbon.

WROUGHT IRON

This was the earliest form in which iron was used; it is manufactured from cast iron by means of the puddling or reverberatory furnace. In this furnace the fire and the metal are kept separate, the bottom of the hearth being first lined with cinder, red hematite, or some such substance rich in oxygen, and then filled with broken pig iron. The fire is then started and after a time the pig iron becomes molten, and the bottom lining gives off its oxygen, which combines with the carbon in the pig iron and passes off as carbon dioxide. The person in charge of the furnace stirs or puddles the

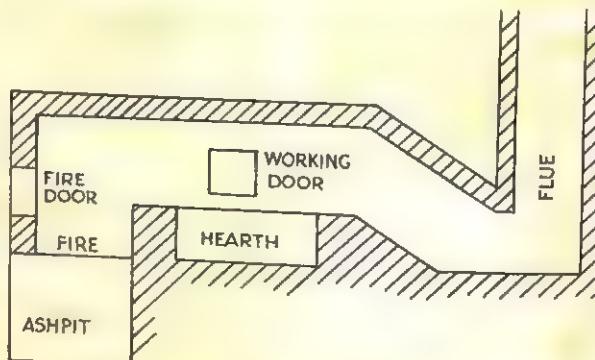


FIG. 3

Section of Reverberatory Furnace



METALWORK

A group of Hammered Work inset with Enamel

molten mass to assist the process. When all the carbon has passed off, the fire is allowed to die down, and the metal is drawn. This product is known as a bloom or ball, which is hammered by a steam hammer to squeeze out any slag, then rolled to the required size, and thus becomes wrought iron. Wrought iron is practically pure iron, and has a fibrous structure.

STEEL. Steel is divided into two groups, one known as mild or constructional steel, and the other as cast or crucible steel. The first, as its name implies, is used for all constructional purposes, and the latter for all cutting tools, as it is the only metal that will harden and temper.

MILD STEEL

Mild steel is produced by two processes, known respectively as—

1. The open hearth process.
2. The Bessemer process.

In the open hearth process, pig iron and rusted scrap are placed together in a suitable hearth and melted by means of a gas flame. The rusted metal gives off its oxygen, which carries away the carbon of the pig iron. When decarbonization is complete, recarbonization is done by means of ferro-manganese or spiegeleisen.

The Bessemer process is based on the principle that, if air is forced through the molten pig iron, the carbon is burnt off, and in burning supplies sufficient heat to maintain the metal liquid. The Bessemer converter is shaped like a huge retort approximately 20 ft. in diameter by 15 ft. high, with a capacity of 20 tons. The modern method is to fill the converter direct from the blast furnace. Air is then forced through the liquid metal and, when the flame ceases at the mouth of the converter, decarbonization is complete. Recarbonization is now effected by ferro-manganese or spiegeleisen.

It will be noted that in both these processes the carbon is first removed, and then replaced. In the early days of steel production by these methods, the producers endeavoured to stop the action when the carbon content was of the required percentage, but it was found by practice and experiment that a satisfactory steel could only be produced by first removing all the carbon and then replacing the required percentage. Mild steel contains from .05 to .5 per cent of carbon; low carbon content gives a soft metal such as is used for nails, screws, tubes, and pressed work. High percentage of carbon gives a harder steel, used for parts of machines and axles. (*Note:* Spiegeleisen and ferro-manganese are names applied to very pure pig iron containing from 10 per cent to 50 per cent manganese and 6 per cent carbon.)

CAST STEEL

This was, and is, to a certain extent produced by the cementation process, in which bars of wrought iron are embedded in carbon in an airtight fireclay trough, which is placed in a cementation furnace and maintained at red heat from 10 to 14 days. The carbon combines with the iron, which is now known as blister steel. This is broken up, melted in a closed crucible to give homogeneity, and cast into ingots, hence the name cast steel. This method is gradually giving place to the crucible process, which gives a steel of uniform

quality. The process is under very definite control, and by careful selection of the raw material a cheaper and better steel can be obtained than by the cementation process. The crucible, made from graphite and clay, and holding from 60 to 100 lb. of metal, is packed with wrought iron and the required percentage of carbon, and then sealed with fireclay. This crucible is placed in a gas- or oil-fired furnace (holding from 12 to 20 crucibles), and in about 2 to 4 hours the contents of the crucible are thoroughly melted and intermixed. They are then removed from the furnace; the metal is poured into ingot moulds, these ingots then being rolled to the required section. Cast or crucible steel contains .5 to 1.5 per cent of carbon, and is the only metal that hardens and tempers. It is used for all cutting and precision tools. Alloy steels are made by the addition of one or more elements to the crucible before heating.

Nickel Steel. 3 per cent nickel, a valuable structural steel.

Chrome Steel. 10 to 14 per cent chromium. Stainless steel.

Vanadium Steel. 1.5 chromium, .25 per cent vanadium. Resists repeated stresses. Much used in automobile work.

Tungsten Steel. 15 to 20 per cent tungsten. Very hard. Used for high-speed cutting tools.

COPPER

There are many methods of extracting metallic copper from its ores but the one in general use is known as the Dry or Welsh method. This consists of first roasting and then smelting the ore in a reverberatory furnace. The copper thus produced has to be refined several times to give a pure, tough metal. The chief difficulty is to remove the sulphur, hence the ore is always roasted as a preliminary to smelting. The sulphur fumes are used for the manufacture of sulphuric acid, which is always a by-product in copper smelting.

TIN

Tin is one of the easiest metals to reduce from its ore. The ore is first washed in order to remove the lighter sand and stone, and then mixed with crushed anthracite coal, and smelted in a reverberatory furnace. The burning coal carries off the oxygen and produces a matte of coarse tin, which is again refined by a further smelting.

LEAD

Lead is obtained from its ore by smelting it in a reverberatory furnace. A low heat to drive off the sulphur is first maintained, then increased to allow the metal to flow. Care, however, must be taken not to increase the heat so as to melt the gangue or stony matter.

ZINC

Zinc is one of the few metals obtained by distillation. The ore is first roasted in a reverberatory furnace, converting the sulphides into oxides. The resulting product is mixed with crushed coal and heated in a retort. The coal combines with the oxygen and passes off as C.O., which is ignited at the mouth of the retort. The metal is distilled and collects in a pool at the bottom of the retort. This metal is drawn off three times during the firing of the retort; the first draw is after about six hours and gives about 40 per cent of the metal, the second, after about 14 hours, giving 50 per cent, leaving 10 per cent for the final draw, which is taken after about 20 hours.

NICKEL

The modern method of reducing nickel from its ores is known as the "Mond" process, which consists of concentrating the ore into a nickel oxide by roasting and smelting. These oxides are slightly heated and intermixed with carbon monoxide. This forms nickel carbonyl, which when forced through heated tubes deposits a pure metallic nickel.

ALUMINIUM

Aluminium is extracted from its ore by electrolysis. Tanks or cells about 5 ft. square by 3 ft. high are lined with carbon to form the cathode (electric negative). The anode (electric positive) is formed of carbon rods. The bauxite is dissolved in melted cryolite, a mineral consisting of sodium fluoride and aluminium; when an electric current is passed through the mixture the oxygen of the bauxite combines with the carbon in the anode, and metallic aluminium precipitates at the bottom of the cell.

ALLOYS

Alloys are produced when two or more metals are melted and mixed together, a good example being copper and tin, forming bronze; or when a metal is mixed with a non-metal such as iron and carbon, forming steel. All alloys are homogeneous in structure, and as a rule differ considerably in physical properties from their constituents. An alloy always has a lower

melting point, and is usually much harder, than the average of its components.

COMMON ALLOYS

Bronze	Copper 90%, tin 10%
Brass	Copper 60%, zinc 40%
Pewter (fine) . . .	Tin 90%, copper 10%
Pewter (common) . . .	Tin 75%, lead 25%
Tinman's solder . . .	Tin 50%, lead 50%
Plumber's solder . . .	Tin 33%, lead 67%

Commercial Stock Sizes of Metal

MILD STEEL. Mild steel is usually stocked in rounds and squares from $\frac{1}{16}$ in. to 3 in. in diameter and length of side respectively, increasing by sixteenths from $\frac{1}{16}$ in. to $\frac{1}{2}$ in., by eighths from $\frac{1}{2}$ in. to $1\frac{1}{2}$ in., and by quarters from $1\frac{1}{2}$ in. to 3 in. Rectangular mild steel is rolled from $\frac{1}{16}$ in. to $\frac{3}{8}$ in. thick by any width from $\frac{1}{4}$ in. to 6 in. Sheets of $\frac{1}{16}$ in., $\frac{3}{32}$ in., and $\frac{1}{8}$ in. thickness, 4 ft. long by 2 ft. wide, are usually stocked. Mild steel rolled to hexagonal and octagonal and half-round sections are obtainable from most of the well-known firms.

CAST STEEL. Cast steel is usually stocked in round, square, hexagonal, and octagonal sections from $\frac{1}{8}$ in. to 1 in. by eighths, and rectangular from $\frac{1}{16}$ in. to $\frac{3}{8}$ in. by sixteenths thick and from $\frac{1}{4}$ in. to 1 in. wide.

TINPLATE. The most common sizes of tinplate are 20 in. by 14 in. and 28 in. by 20 in. These sizes are obtainable in all the standard thicknesses, which are governed by a gauge peculiar to this material. Sheets 14 in. by 20 in. of thickness 1X ($.0148$ in.) and 1XXX ($.018$ in.) will be found very suitable for school use.

BRASS AND COPPER are readily obtainable in rounds and squares $\frac{1}{16}$ in. to 1 in., increasing by sixteenths, and rectangular sections up to 1 in. by $\frac{1}{2}$ in. The usual sizes of sheet brass and copper are 4 ft. by 2 ft., the thickness being governed by the imperial standard wire gauge: Nos. 32 ($.0108$ in.), 28 ($.0148$ in.), 24 ($.022$ in.), 20 ($.036$ in.), and 16 ($.064$ in.) will be found the most useful thicknesses.

ZINC. The common stock sizes of zinc sheets are 8 ft. by 3 ft., the thickness being governed by a gauge peculiar to this metal. Nos. 8 ($.015$ in.) and 9 ($.018$ in.) are very suitable for school use.

CHARCOAL IRON. A very soft ductile metal known as charcoal iron (wrought iron finished and annealed in a charcoal fire) is very suitable for work requiring a lot of bending and shaping, and is obtainable in sheets 4 ft. by 2 ft. of thickness, varying from $\frac{1}{4}$ in. to $\frac{1}{16}$ in., increasing by 64ths of an inch.

Sheets and bars of aluminium and nickel are obtainable in most of the sizes quoted for brass and copper.

Brass and copper wire are obtainable in round, square, half-round, quadrantal, rectangular, and triangular sections.

Metalwork Equipment and Tools

BENCHES AND VICES

The most essential appliances in equipping a room for metalwork are the benches and vices.

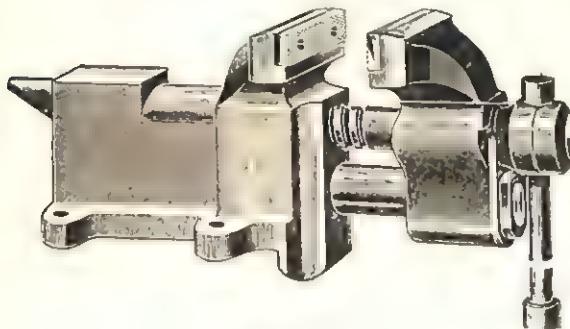


FIG. 4
Parallel Vice

The benches should be strongly constructed, the top board being at least $1\frac{1}{2}$ in. thick, and about 3 ft. 2 in. high. There should be one vice for each pupil under instruction. Many types of vices are available, but the most suitable for a school workshop is a parallel vice with a $3\frac{1}{2}$ -in. jaw (Fig. 4). When fixing vices to bench it is advisable to allow at least 3 ft. between the centres of each vice.

FILES

Files are classified by: (a) Length, which varies from 3 in. to 18 in.; (b) coarseness of teeth, of which there are six degrees, i.e. rough, middle, bastard, second cut, smooth, and dead smooth; (c) sectional form—files are made in a multiplicity of sections, the most common

being flat (rectangular), half-round, round, square, and triangular. The most suitable files for school use are a 10-in. flat bastard, a 10-in. second cut, and a 10-in. flat smooth for each pupil, and an assortment of 8-in. bastard and smooth files of various sections for particular jobs.

Files should be used by gripping the handle firmly in the right hand with the index finger extended along the sides of the file, while the left hand should steady the end of the file by one of the following methods: (a) two fingers underneath and the thumb on top; (b) by holding the end of the file in the palm of the hand and closing the fingers underneath parallel to the long edge; (c) by extending the thumb as far as possible away from the fingers and allowing the hand to lie flat along the top face. Each of these methods has particular advantages; for instance, (a) method allows the file to be used on any particular part of the work, (b) allows weight to be put on the file when a considerable amount of metal has to be removed, (c) enables the file to be used on large flat surfaces. The tendency in filing is always to produce a rounded or convex surface. This tendency is considerably reduced if the file is used with its long edge at about 45 degrees to the work, instead of straight across.

The method of finishing a filed surface is known as draw-filing. This operation is performed by holding the file with both thumbs on one edge and the tips of the fingers on the opposite edge, then lightly working the file forward and backward, with the long edge of the file at right angles to the long edge of the work.

OTHER SMALL TOOLS

RULES. The common type of measuring tool used is a 12-in. steel rule divided into sixteenths of an inch.

SQUARES. Steel try squares with a $3\frac{1}{2}$ -in. stock meet the needs of ordinary school work.

SCRIBERS. Scribes are used for marking on metal in the same manner as pencils are used in drawing, and are usually made from $\frac{1}{8}$ -in. diameter cast steel. No. 6 knitting needles make quite efficient scribes.

CENTRE PUNCHES made from $\frac{3}{8}$ -in. octagonal cast steel are large enough for pupils' use.

INSIDE AND OUTSIDE CALIPERS should be provided for measuring internal and external diameters.

DIVIDERS. Spring or wing types are suitable and should be about 5 in. long.

HAMMERS. The ordinary ball-peened engineer's hammer weighing 12 oz. will be found most suitable for pupils' use.



FIG. 5
Engineer's Hammer

MALLETS. Hide mallets with a flat face of $1\frac{1}{2}$ in. diameter are used for flattening and making straight bends, while egg-ended box-wood mallets of varying sizes should be supplied for bossing and raising.

SAWS. Piercing saws (the metal-worker's fretsaw) capable of taking 5-in. blades, and

"Whitworth" English standard thread from $\frac{1}{8}$ in. to $\frac{1}{2}$ in. are essential tools.



FIG. 8
Tinman's Shears

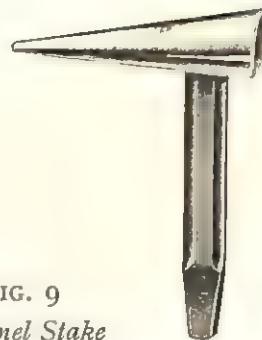


FIG. 9
Funnel Stake

SHEET METAL TOOLS. The following tools are necessary for this branch of metal working—

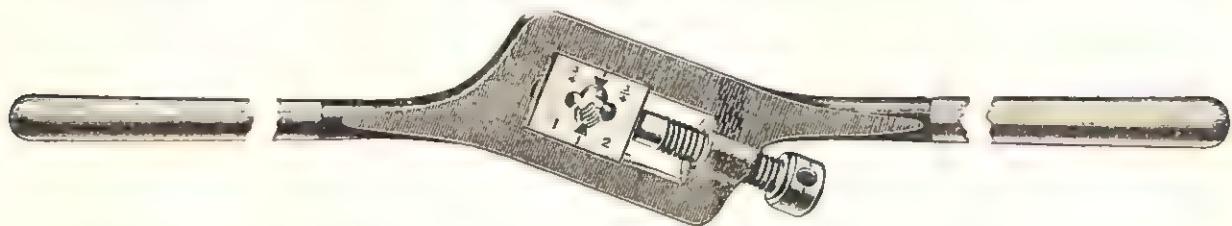


FIG. 6
Stock and Dies (Whitworth Pattern)

hack saws to take 10-in. blades, will be found of sufficient size to meet all requirements.

STOCKS, DIES, AND TAPS, for cutting the



FIG. 7
Whitworth Standard Taps

FOLDING BARS. These can be made as part of the scheme of work (see Fig. 14).

SHEARS. 3-in. blade.

HATCHET STAKE about 6 in. long.

FUNNEL STAKE about 9 in. long.

BICK-IRON about 14 in. long.



FIG. 10
Bick-iron

Most other stakes can be made from hard wood as required.

SOLDERING IRON. The hatchet type is most suitable for student's use. This tool can be made by the pupils (see Fig. 16). A small gas-fired stove is the usual and certainly the most convenient appliance for heating soldering irons. A small gas blow-pipe with foot bellows is necessary for brazing and silver soldering.

FORGE TOOLS. A small forge with a hearth about 18 in. square, complete with mechanical fan, is quite suitable for school workshops. The anvil should be about 4 in. across the face, and if mounted on a block of wood is not so noisy as when fixed in a metal stand. A few

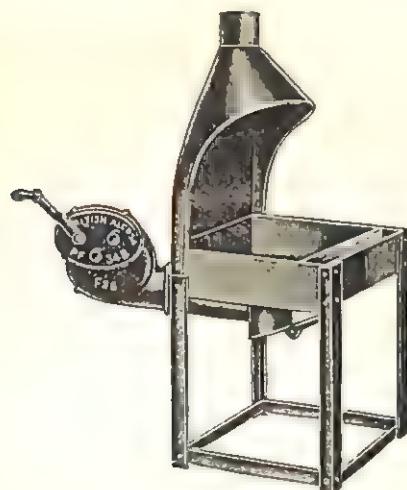


FIG. 11

Forge (with Mechanical Fan)

Scheme of Work

SCHEME OF WORK. All branches of metalwork are governed by certain fundamental operations and processes. These primary operations should be practised by every pupil by means of a set scheme, so that some skill in tool manipulation

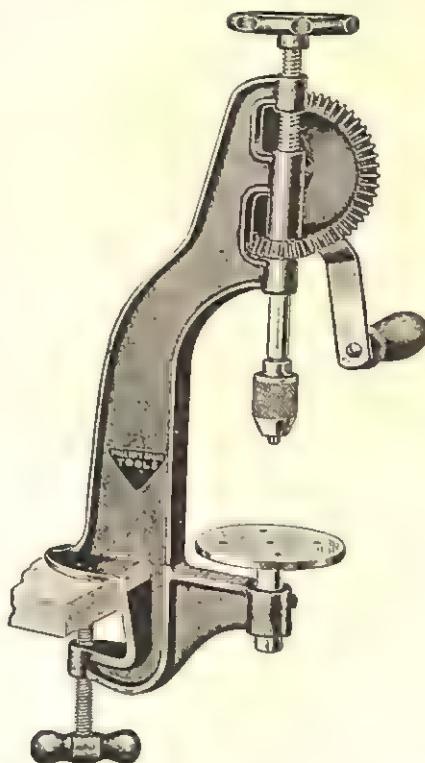


FIG. 12

Bench Drilling Machine

smith's tongs of various shapes are necessary for holding short lengths of metal.

FORGE HAMMERS. Engineer's hammers of 16 to 20 oz. will meet all the usual requirements.

DRILLS. A small bench drilling machine capable of holding drills up to $\frac{1}{2}$ -in. diameter will suit all the needs of a school workshop.

LATHES. It is now usual to equip metalwork rooms with some type of lathe; but should power not be available, a small size should be chosen, otherwise much heavy manual labour is demanded. A lathe with 3-in. centres and 18-in. bed will be found sufficient for teaching all the elementary principles of turning.

and familiarity with technical processes is acquired before the pupil is allowed to proceed on his own initiative.

The following scheme covers the principal tool operations and technical processes.

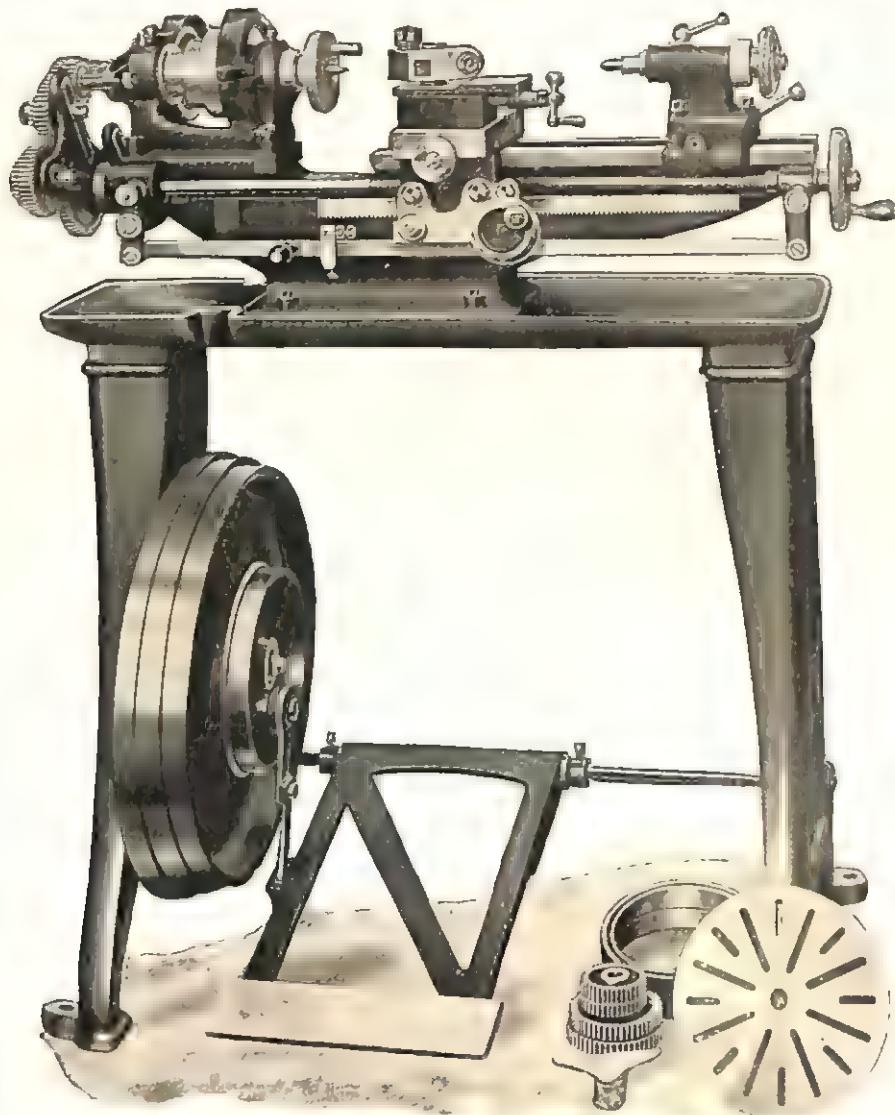
Vice and Bench Work (Fig. 14)

PROJECT I. A 45 DEGREE SET SQUARE. MILD STEEL

Suitable metal should be cut out, leaving about $\frac{1}{8}$ -in. waste. File true one of the short edges, and from this edge square up the second side. Set off the required length on each of

these edges and join up with a scribe line. File to this line and finish by draw-filing each edge, after which mark out and drill the hole.

black, and when it is dry scratch out the name with scribe or sharp point of a pocket knife, then "bite" into the metal with nitric acid.



By courtesy of

Drummond Bros., Ltd.

FIG. 13
3½-in. Screw-cutting Lathe

PROJECT 2. NAME PLATE. BRASS

File true one long edge, and from this edge mark out according to the drawing. Before filing the curved end, saw off the waste material. Finish by draw-filing and polishing with emery cloth, after which the name should be etched. For etching, first coat the face with brunswick

PROJECT 3. FLAT-IRON STAND. MILD STEEL

Determine the length of each part from the drawing. Cut off and file the ends to shape. Then mark out and drill the holes, finally bend and rivet together. A satisfactory riveting block can be made from a 3-in. bar of mild steel 3 in. long. With the tip of a twistdrill cut out

the approximate size of the rivet heads, then heat the bar to redness and round up the holes by hammering in steel balls of the necessary sizes. $\frac{1}{8}$ in., $\frac{3}{16}$ in., and $\frac{1}{4}$ in. diameter balls will make a block suitable for $\frac{3}{8}$ in., $\frac{1}{8}$ in., and $\frac{3}{16}$ in. diameter rivets respectively.

PROJECT 4. DRAWER PULL. MILD STEEL

Mark out and complete the back plate, the corners of which should be sawn off and finished

then washing well and rubbing with sand. Then bronze by dipping the model in a weak solution of ammonium sulphide and coating with a colourless lacquer. Brazing is effected by using a soft brass wire as the uniting alloy and borax as a flux. Pack the work on a hearth with broken pieces of hard coke, then slightly heat with the blowpipe and cover the joint with borax. Then heat to redness and melt sufficient of the brass wire to form a neat joint. Some

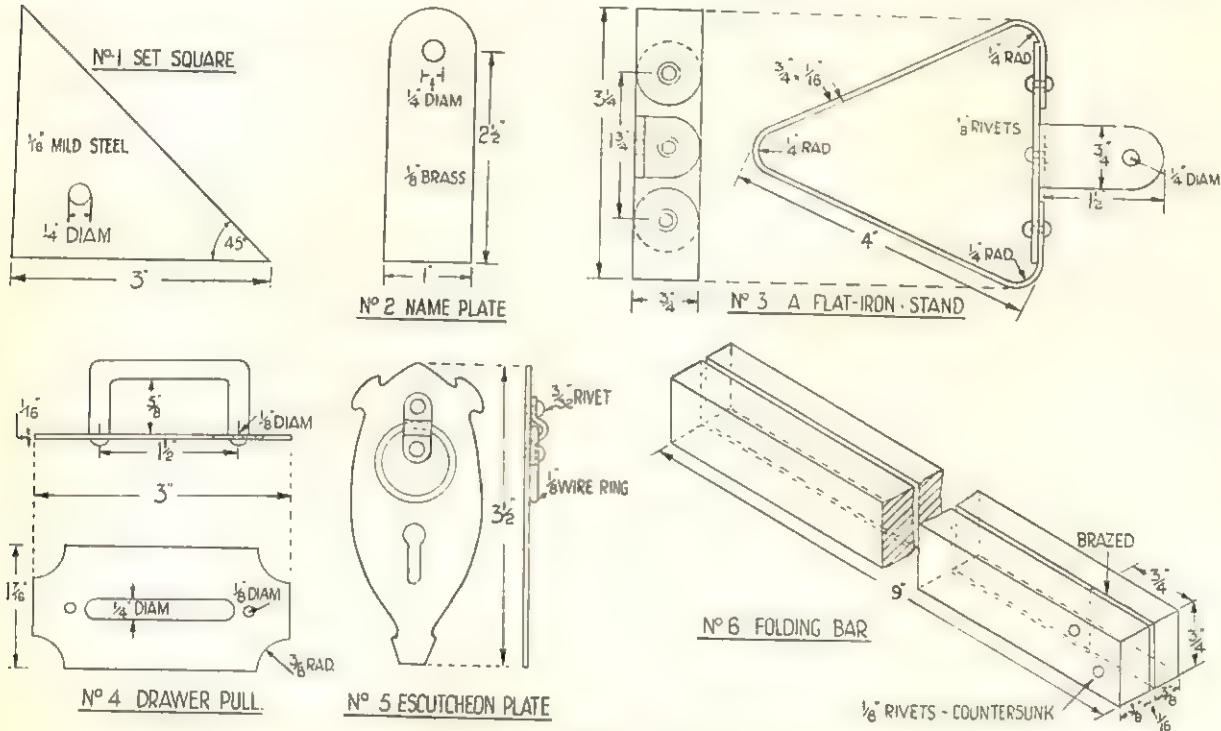


FIG. 14
Schemes of Vice and Bench Work

with a half-round file. Bend the handle in the vice, shouldering the ends with a smooth file (using the safe edge), then fit together, allowing not more than $\frac{1}{16}$ in. to project for riveting. Complete the model by riveting with the ball pane of hammer.

PROJECT 5. ESCUTCHEON PLATE. COPPER

Mark out and complete the back plate, then bend up the handle, which should be brazed together. Make the small stirrup piece and rivet together with $\frac{3}{8}$ -in. diameter rivets. The model can be finished by dipping in nitric acid.

workers prefer to add water to the borax, so making a paste which is lightly applied over the joint before heating. Granulated brass is sometimes used in place of wire, but is not so suitable for small work. Granulated brass and brass wire used for brazing are technically known as "spelter."

PROJECT 6. FOLDING BAR, MILD STEEL

Cut bars off to length, drill and rivet together, then braze the joint so as to prevent movement when in use. True up one long edge and finish by draw-filing and polishing with emery cloth.

Sheet Metal Work (Fig. 15)

PROJECT I. LAPPED JOINT IN TINPLATE

Mark and cut out the tinplate to the sizes shown, then bend each lap to a right angle in the folding bars gripped in the vice. Next close down each lap with the hide mallet, leaving sufficient space to hook the two plates together.

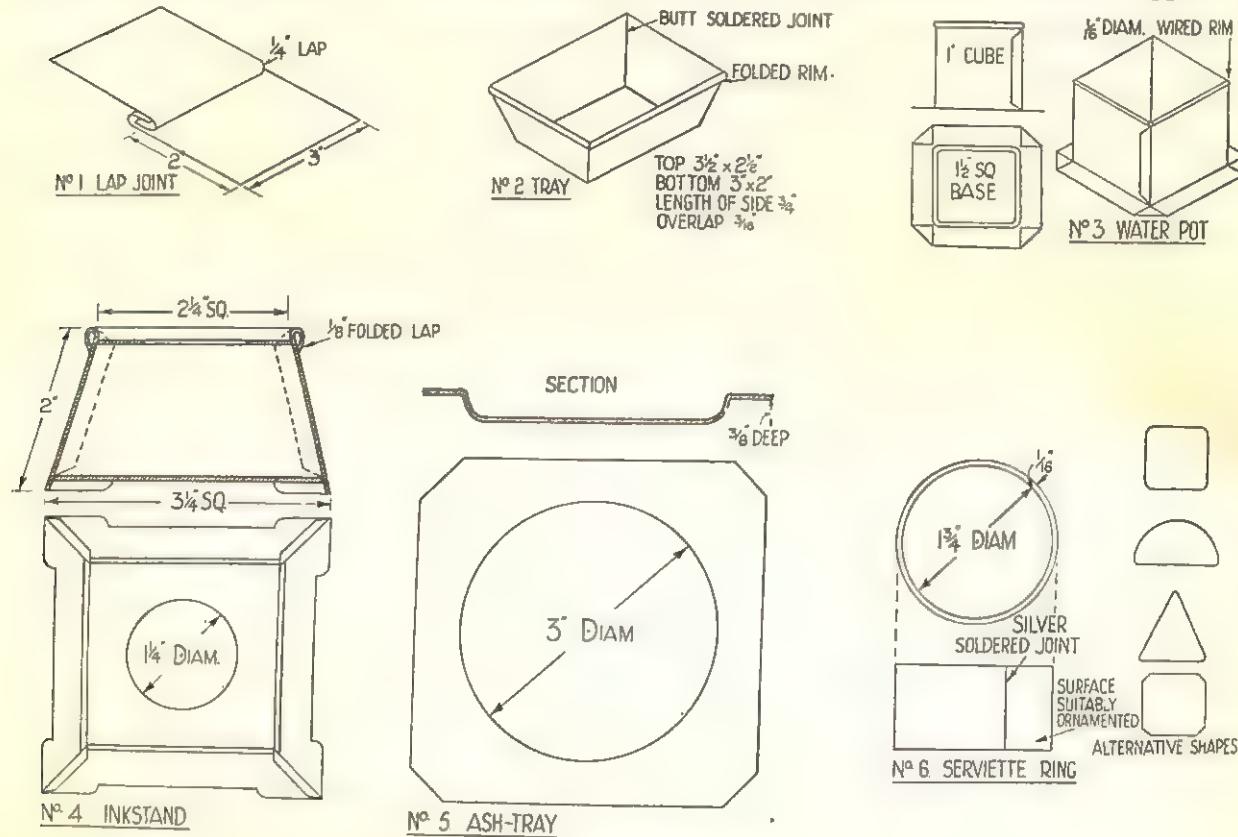


FIG. 15
Scheme of Sheet Metal Work

Finally assemble the joint and close with a few light taps of the mallet and solder both edges. Soft or tinman's solder is usually applied with a soldering bit (commonly called a soldering iron). The bit is made of copper, due to the property of this metal for retaining heat. Before soldering, the work must be free of all oxides, otherwise the solder will not flow. The compounds used for this purpose are known as "fluxes"; a true flux not only removes oxides from the work, but prevents the formation of further oxides during the process of soldering.

The common and most efficient flux for soft soldering is zinc chloride, made by dissolving scraps of zinc in hydrochloric acid and diluting with about 50 per cent water. This flux can be used on all the common metals with the exception of zinc, the flux for which is 1 part hydrochloric acid with 3 parts water. When soldering it is important to use the copper bit

at the correct temperature (this is best judged when bright green shows in the flame used for heating). A cold iron will not "flow" the solder, while an iron that is too hot is inclined to leave the work "bumpy." It is best to pick up solder from a patch melted on to a scrap of tinplate, rather than from the bar. Always endeavour to use the minimum amount of solder to "make" the joint, as solder once on the work can only be removed by spoiling the look of the job. Plenty of flux should be used on the joint, and whenever the iron is reheated the tip must

be cleaned by dipping it in the flux before using.

PROJECT 2. A TRAY. TINPLATE

Draw out the development and cut to size, fold up the lap edges in a folding bar, and close down with the mallet, fold up the sides by placing a block of wood on the base and pulling each side up with the fingers. Neatly solder each corner.

PROJECT 3. A WATER CONTAINER. TINPLATE (For use with water-colour paints.)

Mark and cut out the development of each piece. (*Note:* The allowance on the top edge for wiring is two and a half times the diameter of the wire to be used, i.e. for $\frac{1}{16}$ -in. diameter wire allow $\frac{3}{2}$ in. of tinplate.) Be careful to cut the tinplate where the wire bends, otherwise the edge of the plate will buckle when being bent. For wiring, first fold the tinplate to a right angle in the folding bar; then holding the wire in place with the end of a steel rule, carefully fold the tinplate over the wire by tapping it lightly with a hammer. After wiring, fold up the pieces and solder.

PROJECT 4. AN INK-POT STAND. ZINC

Zinc is the only metal with a distinct grain; so in marking out the development of this project, care must be taken to arrange the lines so that the bands come across the grain, otherwise the metal will split when being worked. Mark out, cut, and fold up the work according to the drawing. The hole for the ink pot can be taken out either by sawing with the piercing saw or by first drilling a series of small holes, cutting out with a chisel, and finishing with a half-round file. The soldering of this project is simplified if the parts are held together with thin binding wire during the operation. (*Note:* The flux for zinc is dilute hydrochloric acid.)

PROJECT 5. AN ASH TRAY. COPPER OR BRASS

Anneal the metal by heating to redness and cooling in water, then proceed to dish in the well. This can be done by hammering on a sandbag, or into a hole of required size bored in a block of wood. As the metal hardens during the process it should be annealed from time to

time; this simplifies the work and obviates the danger of cracking.

PROJECT 6. A SERVIETTE RING. SHEET COPPER OR BRASS

Mark out and complete any decoration that may be desired, then bend up to shape; the joint should be a plain butt. Secure the ring with thin iron wire so that the edges are up tight, and proceed to silver solder the joint. The operation of silver soldering is identical with brazing except that an alloy of silver (6 parts) and copper (2 parts) is used as the solder. A mixture of borax and water is used as a flux, which is usually painted along the joint; small pieces of the solder are placed where required, and melted into the joint by the blowpipe.

Forge Work

The two primary operations in forge work consist of bending and drawing down. If both of these manipulations are thoroughly mastered, the secondary operations become comparatively simple. Coke breeze is the best fuel for the forge, as it gives a clear fire, practically free from smoke and clinker. (See Fig. 16.)

PROJECT 1. A NAIL PUNCH. MILD STEEL

Use a bar of metal about 2 ft. long and commence by hammering the end square. The point should be got to size in about three heats. Exercise care to see that the amount of metal drawn down in the first two heats is shorter than the required size; in the third heat endeavour to get the length correct, remembering always that "the fewer the heats the better the forging." When the forging is complete, cut off to length and trim up with a file, after which case-harden the point.

Case Hardening. This is the name given to the process by which mild steel can be given a hard skin or "case" about $\frac{1}{2}$ in. deep. The part of the object it is desired to harden is first heated to a full red heat, then dipped into finely powdered potassium ferricyanide, then reheated, and quenched by immersion in water. The chemistry of the process is that the mild steel increases its carbon content by the absorption of carbon from the potassium ferricyanide.

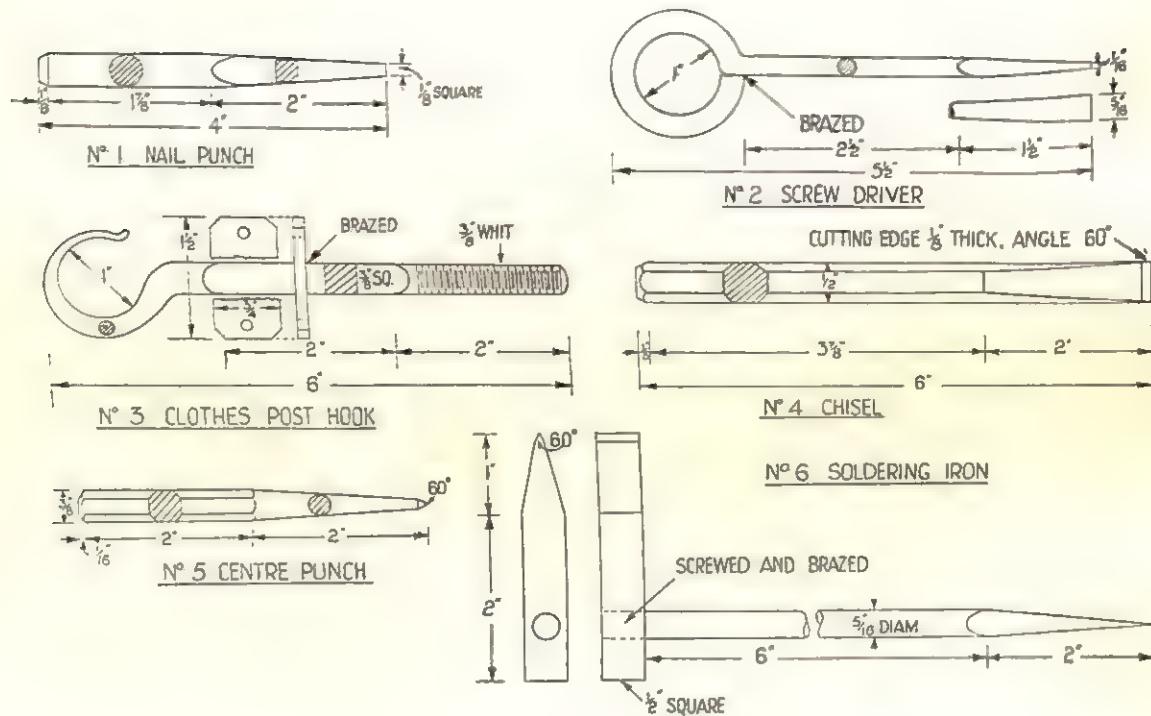


FIG. 16
Scheme of Forge Work

PROJECT 2. A SCREW-DRIVER. MILD STEEL

First calculate the amount of metal required for the ring; this is always obtained by multiplying the *mean diameter* by $\frac{\pi}{4}$ (i.e. a ring 1 1/2 in. inside diameter requires 5 1/2 in. of material). Chalk mark the required distance and heat the bar to redness about this mark; then proceed to forge the part of the ring which joins the straight bar, reheat, and bend round to complete the ring.)

Cut off about 1/2 in. shorter than the finished work and forge down the blade portion, clean up this part with a file, and case-harden the end. (*Note:* The appearance of this project is improved by brazing the end of the ring.)

PROJECT 3. A CLOTHES' LINE POST HOOK. MILD STEEL

First forge the hook portion, using the principles mentioned for the previous project, then cut off to length and round the end as shown in the drawing. Finally screw this part

with the stock and dies to fit a 3/8-in. standard nut.

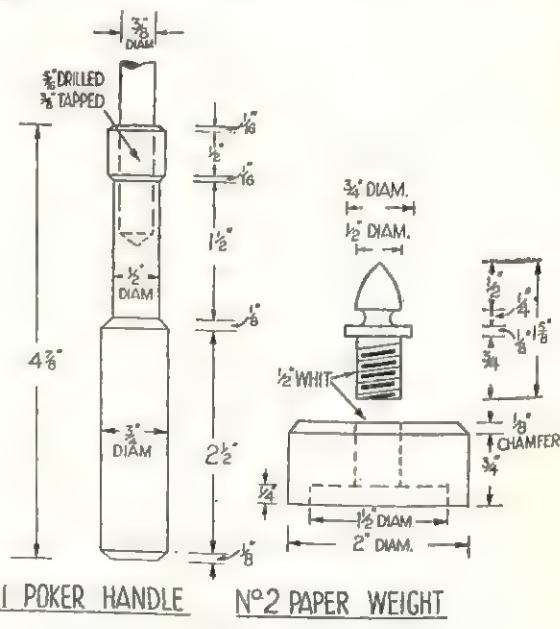


FIG. 17
Scheme of Lathe Work

PROJECT 4. A CHISEL. CAST STEEL

Forge to shape, leaving the work a little full so as to allow for filing when finishing. After which harden and temper.

Hardening and Tempering. Cast steel is

straw colour, and if the heat is maintained the colour changes from light straw to dark straw, to purple, light blue, and finally dark blue. When the required colour is reached cool immediately in clean water.

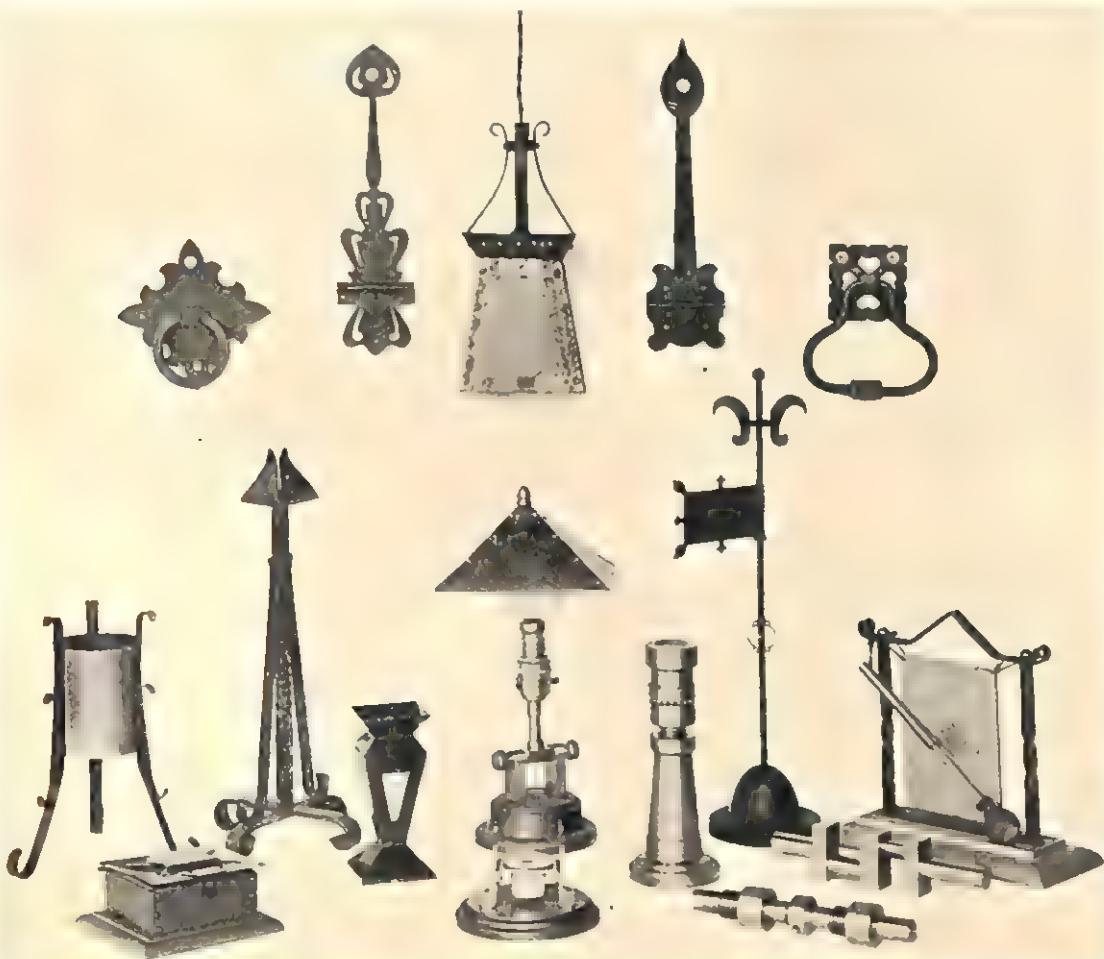


FIG. 18
Suggested Projects

hardened by heating to cherry red and cooling suddenly by immersion in water. Hardness and brittleness always go together, and the metal at this stage is much too hard for practical use. Tempering, which really means removing some of the hardness, is effected by firstly polishing the hardened metal with emery cloth, and then slowly heating in a bunsen flame. The heat gradually causes the metal to assume a light

Colour scale—

Light straw	.	Hammers, razors
Dark straw.	.	Taps, dies, lathe tools, drills
Purple	.	Chisels, punches, plane irons
Light blue :	.	Saws, springs
Dark blue .	.	Screw-drivers, woodwork bits

PROJECT 5. A CENTRE PUNCH. CAST STEEL

Forge full to size, then clean up by filing and polishing with emery cloth. Finally grind the

point and harden and temper. (*Note:* Cast steel heated above blood red quickly deteriorates through loss of carbon content.)

PROJECT 6. A SOLDERING BIT. COPPER AND MILD STEEL

First forge the copper full to size and clean up by filing, then forge the mild steel bar. Drill a $\frac{1}{4}$ -in. diameter hole in the copper, tap this hole with $\frac{1}{16}$ -in. taps, and screw the end of the mild steel bar to fit the copper, after which the screwed part should be brazed to prevent any movement when the tool is in use. (*Note:* If copper is heated above dull red, it tends to crumble under the hammer blows.)

Lathe Work (Fig. 17)

PROJECT 1. A POKER HANDLE. MILD STEEL

Cut off a bar of mild steel about $\frac{1}{2}$ in. larger in diameter and about $\frac{1}{2}$ in. longer than the finished work. Find the centre of each end with dividers, and mark with a centre punch. Drill one end $\frac{1}{2}$ in. diameter, $\frac{3}{8}$ in. deep, and the other $\frac{5}{16}$ in. diameter, about $1\frac{1}{2}$ in. deep. Fix the work in the lathe between centres and turn to size, finishing with emery cloth. Tap the $\frac{5}{16}$ -in. hole with $\frac{3}{8}$ -in. Whitworth taps, and screw a rod of suitable length to fit. The end of this rod should be forged or filed to a square point.

PROJECT 2. PAPER-WEIGHT HANDLE. BRASS

Cut off about 2 in. of $\frac{3}{4}$ in. round brass, and centre both ends with the centre punch; drill these centres $\frac{3}{2}$ in. diameter about $\frac{1}{2}$ in. deep. Fix the work in the lathe between centres and turn down the screw portion, reverse the work in the lathe, and rough out the handle part, finishing with hand tools. Finally screw to size with stock and dies.

PROJECT 2. PAPER-WEIGHT BODY. MILD STEEL

Cut off the material required from a bar of mild steel $2\frac{1}{2}$ in. in diameter, allowing about $\frac{1}{8}$ in. of waste on the length. Fix up in a self-centring chuck and cut the recess; reverse, and secure in chuck with the dogs holding inside the recess, and turn the edges and top face. Finish with emery cloth. Drill $\frac{7}{16}$ -in. diameter hole and tap $\frac{1}{2}$ in.

Extension of the Scheme

SUGGESTIONS FOR WORK AFTER COMPLETING THE PRELIMINARY SCHEME (Fig. 18)

Project	Tool Manipulations and Processes
Hinges . . .	Bending and cutting out of sheet mild steel.
Handles . . .	Cutting out and shaping mild steel. Forging.
Hall lamp . . .	Bending and riveting sheet copper.
Fern pot . . .	Bending and riveting sheet copper and mild steel.
Trinket box . . .	Shaping, raising, and riveting copper.
Candlestick . . .	Forging mild steel.
Vase . . .	Sheet zinc working and soldering.
Electric table lamp	Turning in brass. Bending and riveting sheet brass for shade.
Screw-jack . . .	Turning in mild steel and screw-cutting.
Model weather vane	Sheet metal working and forging in mild steel.
Connecting screw	Turning in brass, screw-cutting right- and left-handed threads.
Crank shaft . . .	Turning in mild steel with various centres.
A table gong . . .	Forge work in mild steel for frame. Sheet brass working for gong. Turning in brass for beater.
A fire screen . . . (Fig. 19)	Forge work in mild steel. Copper working and riveting. The Ruskin Stone on the shield is first set in copper foil and then soldered into position.
A set of chimes	Forge work in mild steel and turning in brass. Hard drawn brass tube is used for the chimes.
Turned candle-stick (Fig. 20)	Turning in mild steel and hardwood.
Clock case . . .	Copper work; decoration by etching and brush enamel.
Turned poker	Turning and knurling in brass.
Letter balance	Instrument work in brass and steel.
Copper kettle . . .	Copper raising, brazing, and silver soldering.

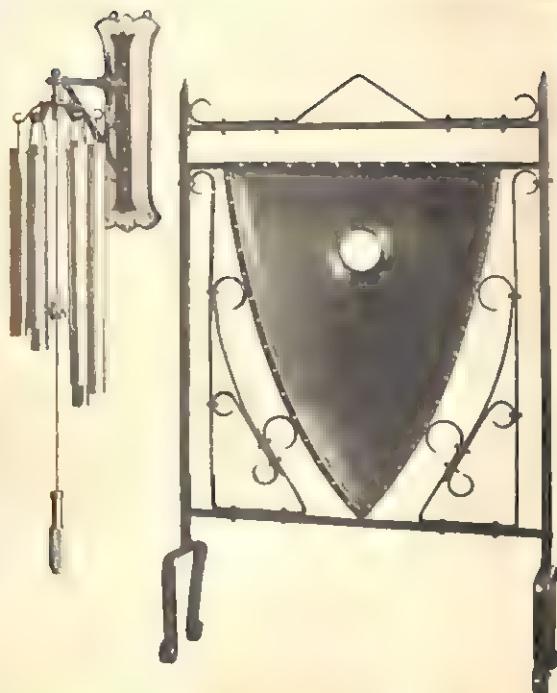


FIG. 20

Candle Stick

Clock Case

Poker

Letter Balance

Kettle

FIG. 19

A Set of Chimes and a Fire-screen



FIG. 21

Copies of Historical Examples

Fig. 21 shows a collection of handles, bolts, hinges, escutcheon plates, and knockers, copied from examples found in old churches, manor houses, and inns. These examples date from about 1600 A.D. to 1800 A.D. Study of the design and craftsmanship of the examples of metal work to be found in the old churches and historic

buildings of our country will provide valuable teaching material. Local collections in provincial museums and the unrivalled exhibit of metalwork in the Victoria and Albert Museum, South Kensington, are unfailing sources of inspiration to both the pupil and teacher of metalwork.

TECHNICAL DRAWING

THE course of technical drawing outlined in the following pages is intended to provide pupils with an introduction to the general rules and conventions employed in preparing working drawings, and not only to train pupils in the preparation of examples, but also to enable them to read ordinary working drawings with facility. Technical drawing is the application of the principles of practical plane and solid geometry, and some training in this subject should always precede a course in technical drawing.

Drawing Instruments and Equipment

At the outset of a course in technical drawing the pupil should be equipped with a drawing board and tee square. He will thus, from the beginning, become familiar with the professional method of drawing. Hitherto, the use of these tools at this early stage was condemned on the grounds of the pupil's lack of manipulative skill. However, the writers have found that young pupils experience so much difficulty in drawing without the aid of the board and square that the accuracy of the work leaves much to be desired.

The following equipment is suggested—

DRAWING-BOARDS. The most suitable size is 16 in. \times 13 in., which takes a quarter imperial sheet of drawing paper, a very convenient size for working out the exercises set in this course. The board could easily be made from ply board in the woodwork room.

TEE-SQUARES. Squares with a 17 in. blade are recommended; these again could be made in the woodwork room. A board and square of these dimensions will also be found satisfactory for use on the ordinary school desk, and they will present little difficulty in storing.

SET-SQUARES. Celluloid set-squares are recommended, but the usual pearwood variety is quite suitable. The following size will be found most

convenient—45° 6 in. on the short edge, 60° 5 in. on the short edge.

RULER. It is recommended that the ruler should be reserved for this subject. The ordinary boxwood type, marked in centimetres and in $\frac{1}{16}$ in., $\frac{1}{8}$ in., and $\frac{1}{16}$ in., will be found most suitable.

COMPASS. It must be emphasized that good work is impossible with a poor tool. First-class compasses are expensive, but a reliable article should be obtained and selected after consideration of the point and joint. The former should be round hard steel and rather small, while the latter should allow the compass to open smoothly without shake. Further, the joint should be screwed, not riveted, thus permitting adjustment for wear.

PENCIL. An H pencil sharpened with a chisel point at one end and a round point at the other is advised.

PROTRACTOR. The semi-circular protractor gives more accurate results than the rectangular type, and is easier for pupils to use.

PINS. Brass-headed pins will last much longer and prove more satisfactory in use than the common pressed-steel variety.

RUBBER. Small, soft rubbers of about 1 in. \times $\frac{1}{4}$ in. \times $\frac{1}{4}$ in. thick are recommended for pupils' use.

PAPER. Smooth cartridge paper is quite suitable.

BOXES. Boxes should be provided for storage of the above-mentioned tools. This will encourage pupils to take a pride in their maintenance. If the design is kept simple, the box can be made in the woodwork room, suggested inside dimensions being 12 $\frac{1}{2}$ in. \times 6 in. \times 1 in.

Using Drawing Instruments

General instructions may be summarized as follows—

1. **Fixing drawing-paper.** Two drawing-pins

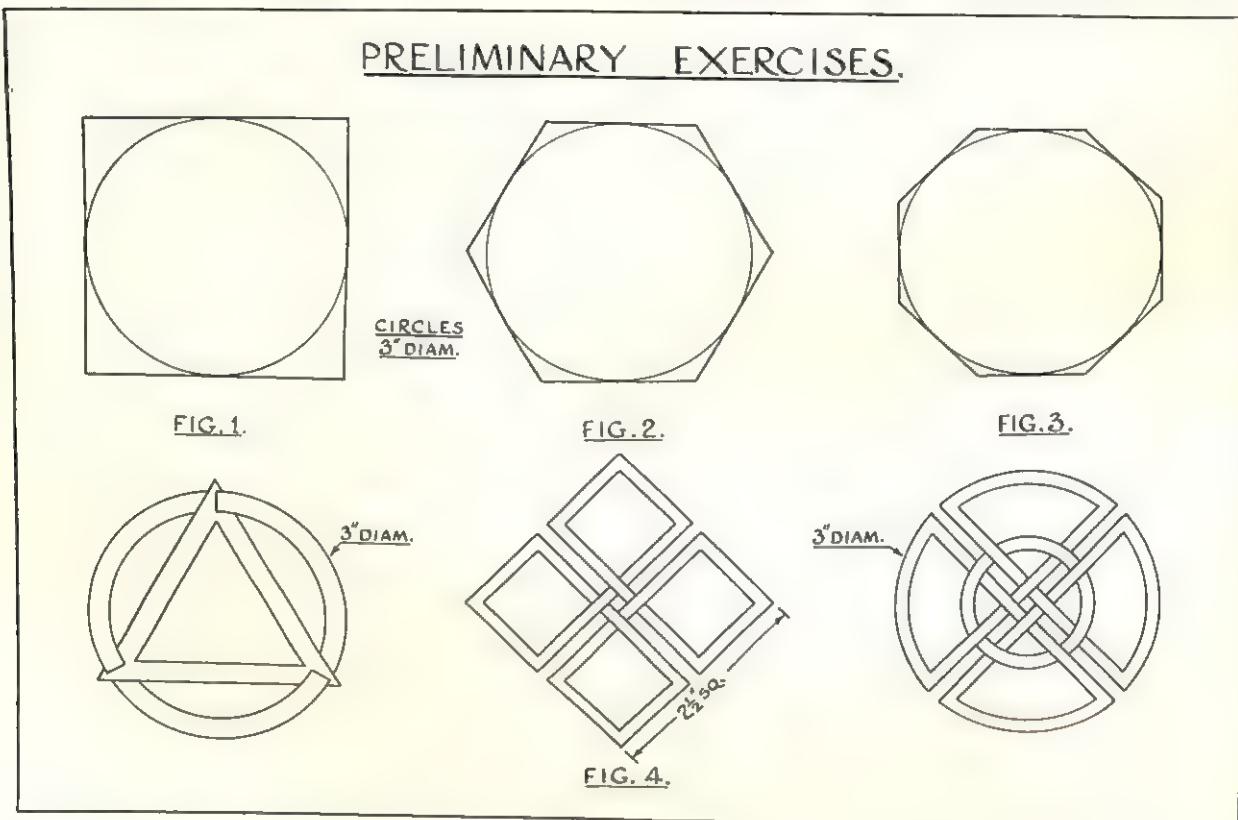
are sufficient, one in each top corner. The paper may be prevented from "cockling" by inserting the second pin with a downward and outward movement.

2. *The pencil* should be used as close to the edge of the squares as is possible and inclined slightly in the direction of motion.

set-square working in conjunction with the tee-square.

Preliminary Drawing Exercises

To acquire facility in the use of the instruments, the exercises given here should be worked



3. *The tee-square* must only be used with the stock on the left-hand edge of the drawing-board, and is moved up and down the paper with the left hand. Horizontal lines should be drawn from left to right with the tee-square, and in general all other straight lines should be drawn "away from you."

4. *The set-square* should be held with two or three fingers of the left hand against the tee-square, the remaining fingers of that hand pressing the tee-square blade against the paper to prevent the former from slipping while the pencil is working. Set-squares are used principally for drawing lines perpendicular to and parallel to any given line. This is effected by using either two set-squares together or one

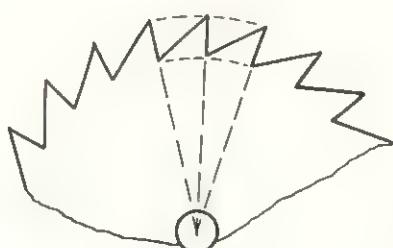
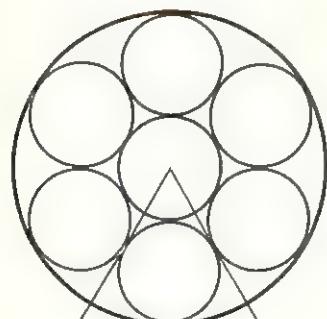
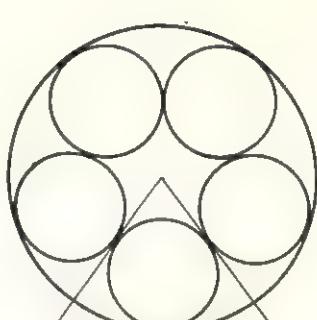
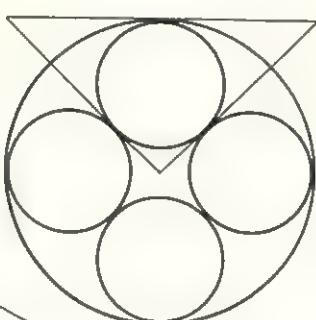
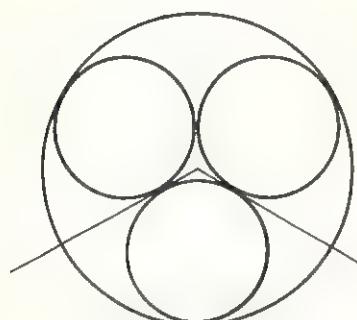
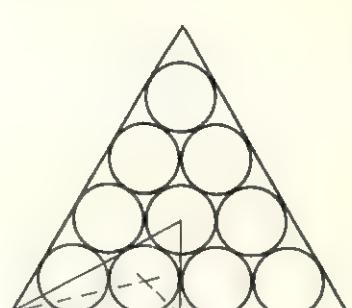
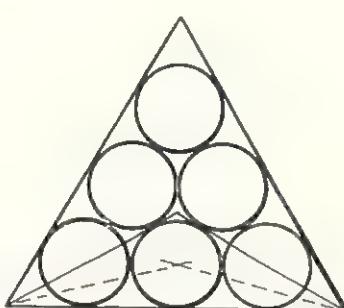
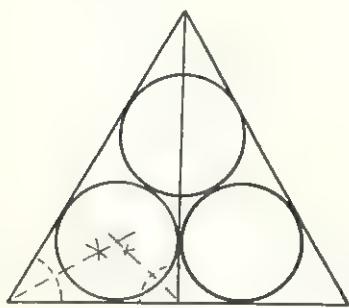
(Figs. 1-4). In the first three of these constructions consider the figure as being made up of tangents to the inscribed circle.

When a drawing consists of both circular and straight lines it is essential to remember that the compass work must be completed before drawing in the straight lines.

An Introductory Course in Geometrical and Scale Drawing

The pupils should first obtain a sound foundation of geometrical terms and practice, not by way of a series of formal geometrical proofs and problems but rather by means of practical and interesting constructions.

SUGGESTIONS FOR EXERCISES INVOLVING CONSTRUCTING A CIRCLE TO TOUCH THREE GIVEN LINES.



CIRCULAR
SAW. (N^o. 4)

STEERING
WHEEL. (N^o. 9)

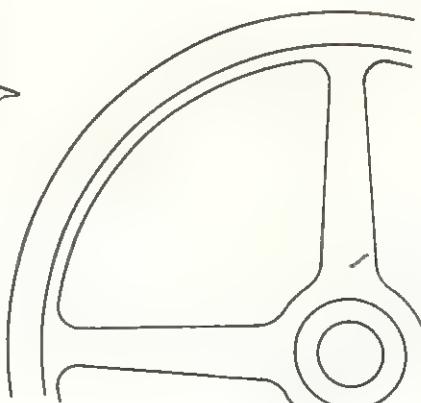


FIG. 5

Complicated constructions should be avoided; for, although they emphasize the need for a high degree of accuracy, their geometrical importance is often very small and not at all commensurate with the time and effort expended on them.

Every opportunity should be taken to practise scale drawing, but after the initial exercises the pupils should be trained and encouraged to select the appropriate scale themselves (see Board of Education *Suggestions*).

Many opportunities in connection with these

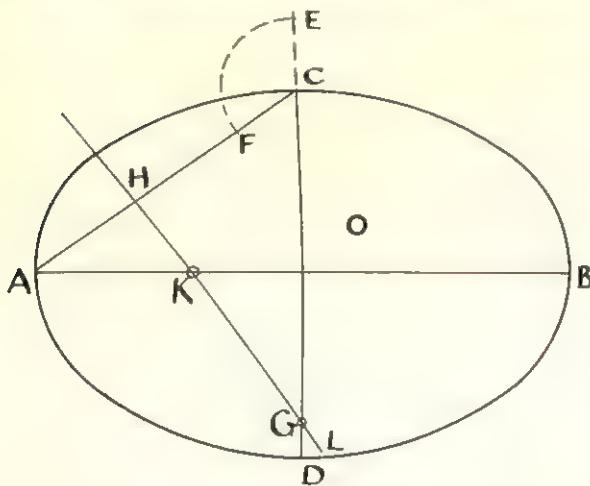


FIG. 6

Approximate Method of Constructing an Ellipse

constructions may occur when the use of simple plans and elevations would be of great assistance to the lesson. Such opportunities should be used but the discussion of them kept on informal lines. It is never too early to begin using simple plans and elevations, for the ability to read them is almost as essential as a knowledge of science in modern everyday life, besides being of great help to the teaching of other subjects such as mathematics, geography, and handicraft.

An ever-increasing importance should be attached to exact measurement—the corner stone of all accurate practical work—but it should be remembered that accuracy is a relative term, and must therefore vary with the age of the class, and the quality of the instruments used. Nevertheless, no matter what

standard of accuracy is adopted, there should be no relaxation, but a steady and persistent emphasis to obtain this standard.

The suggestions set out below are intended, not to be final or comprehensive, but rather as a minimum that may be developed according to the particular requirements and bias of the school—

1. Revision of linear measurement.
2. Parallel lines (by compass, set-squares or T-square).
3. Bisection of lines and angles.
4. Dividing lines and angles into given number of equal parts.
5. Construction of simple scales.
6. Circle to pass through 1, 2, or 3 given points.
7. Circle to touch 1, 2, or 3 given lines.
8. Circle to touch 1 or 2 given circles.
9. Simple combinations of 6, 7, and 8.
10. Regular polygons.
11. Dividing lines in given ratios.
12. Methods of copying drawings.
13. Enlarging and reducing polygons.
14. The ellipse.

This chapter does not permit of a detailed working out of the above course, but suggests how a practical bias may be given to the otherwise academic exercises. The keynote should be: relate the lesson to the pupil's experiences. Call the circles hoops, pills, balls, pipes, and such like articles of everyday usage—but a word of warning here: let it be, not "Let us suppose this is a hoop," but rather "This circle represents a hoop lying on the playground." For example, consider the construction of a circle to touch three given straight lines, that is the inscribing of a circle in a given triangle. If the lesson follows naturally on the previous one, the pupils should have little difficulty in discovering the necessary construction, and after copying it into their books might be set the problems suggested in No. 7 in the sections below (see also Fig. 5).

Taking the sections enumerated above, the following scheme is suggested—

1. Measuring of diagrams in class text-books, e.g. arithmetic text-books.

2. Tram or train lines, brick walls.
3. Constructing a protractor.
4. Drawing cart wheels, etc.; with 3, 4, 5, 6 spokes.

Draw a circular saw (see Fig. 5).

5. Scale drawing. Copying simple drawings, e.g. house plans.

Supply pupils with a house plan showing only one dimension, and set them to construct the missing scale and thus find all the missing dimensions.

6. Given a portion of a wall in Flemish bond, showing two nails, *A* and *B*, say 18 in. apart, draw a 2 ft. 6 in. diameter hoop hanging over them. Place another nail in the wall, touching the hoop and equidistant from both *A* and *B*. Place a nail *C*, say 20 in., below *A*, and find the size of the hoop that will touch *A*, *B*, and *C*.

7. Take an equilateral triangular frame of 12-in. side (internal measurement) and find the diameter of the balls used when it is just filled with (a) 1 ball, (b) 3 balls, (c) 6 balls, and (d) 10 balls (see Fig. 5). Ball in a vee groove.

8. Inscribe 3, 4, 5, and 7 circles in a given circle (pills in a box), see Fig. 5.

A bundle of assorted dowels.

6 ft. 1 in. and their ratio is 1 : 1½ : 2, find these three circles and draw them touching each other.

Many of the ratio problems dealt with in the mathematics lesson are also suitable drawing exercises.

- 12 and 13. The survey data of a field by the offset method affords many practical exercises under this heading, e.g. from the data supplied draw the field to scale and then find the data for a field of four times the area.

14. Construction of the ellipse.

The focal and trammel methods are recommended. For workshop use the following approximate construction is very useful—

AOB and *COD* principal axes.

OE = *OA*.

CF = *CE*.

Bisect *AF* at *H* and draw *HL* at right angles to intersect *AO* in *K* and *OD* produced in *G*.

Then *K* and *G* are the centres of the arcs.

Another method of adding variety and interest to the work is the tabular form of answer, e.g. in connection with triangles, give data for three different triangles, scalene, isosceles, and equilateral, and set the class to fill up the following table—

Triangle	Angles				Height	Area	Perimeter	Radius of	
	A	B	C	Total				Incircle	Circumcircle
Scalene . . .									
Isosceles . . .									
Equilateral . . .									

A string of graduated beads arranged in various positions (square, circular, etc.).

9. Motor-carsteeringwheel (the fillet arc should not be put in by "trial and error"). See Fig. 5.

10. Given a piece of wood 20 in. by 16 in. by $\frac{3}{4}$ in., show how to cut the largest hexagonal table top. Show how to cut out the largest equilateral triangle from a 4-in. square.

11. Construct the triangle whose sides are in the ratio 1 : 1½ : 2, and which has a perimeter of 6·1 in.

If the sum of the diameters of three circles is

Occasionally, to rouse interest, and also to encourage pupils to judge length, have guessing competitions: hold up rods of various lengths and ask the boys to write down their lengths, also set pupils to draw lines and circles of given sizes without using the ruler.

Projections

PICTORIAL PROJECTION

For illustrating ideas in constructive work the draughtsman often uses some form of

pictorial projection. This type of drawing is an attempt to combine the vividness of a hand sketch with the accuracy of a working drawing. Two methods are in common use, namely, Oblique Projection and Isometric Projection.

OBLIQUE PROJECTION. The rules may be summarized as follows—

1. All lines parallel on the object are parallel in the projection.
2. One face of the object is considered parallel to the observer and therefore represented in true shape in the projection.

isometric axes, and all measurements must be made parallel to them.

3. Complete the drawing of the cube with lines parallel to these axes, as shown in Fig. 11.

When the object is not rectangular in form, the plan and elevation must first be drawn, and then the auxiliary construction erected on them before the isometric projection can be drawn. (See Fig. 16.)

To obtain a truly accurate projection of the cube, the edge measurements should be scaled down to allow for the shortening caused when

OBLIQUE PROJECTION

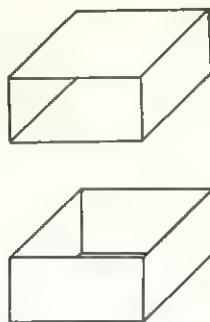


FIG. 7. MATCHBOX

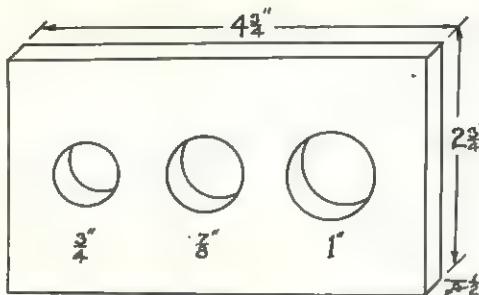


FIG. 8. DOWEL PLATE

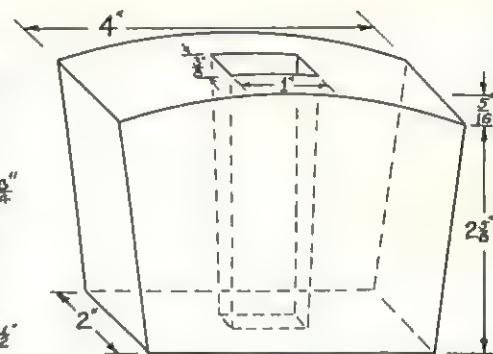


FIG. 9. MALLET

3. Lines perpendicular to this face are represented in the projection by lines drawn at 45 degrees to the horizontal. To counteract the distorted appearance that would otherwise be given to the projection, these lines are drawn to half the scale used for drawing the front face.

ISOMETRIC PROJECTION. This is a more accurate pictorial drawing than oblique projection, and furthermore does not require the use of two different scales on the same drawing.

The rules may be summarized as follows—

1. Consider a two-inch cube held with one corner immediately in front, and with one principal diagonal vertical, so that all three mutually perpendicular edges of the cube meeting at the nearest corner appear inclined equally to the line of vision.

2. Draw these three edges 2 in. long, as shown at *AB*, *AC*, *AD* in Fig. 10. These are called the

they are inclined to the line of vision. This is done with the aid of an isometric scale, but in practice the full-size measurements are always used directly on the isometric axes.

When pupils have mastered the rules they will be in a position to work the exercises shown in Figs. 12-16.

Orthographic Projection

The most common method of representing a solid on a plane surface is that known as Orthographic Projection. It is absolutely accurate, as it preserves the proportions of the various parts, and also allows measurements to be taken directly to scale. Figs. 17 and 18 show the projections of a set of steps according to British standard practice. When introducing this subject, illustrate, by means of a pair of folding

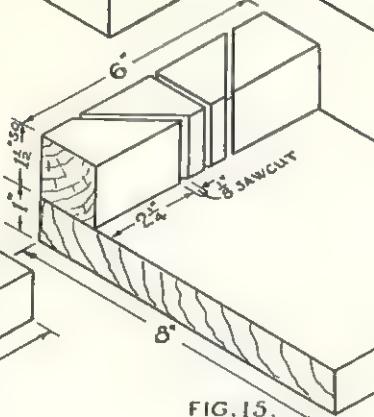
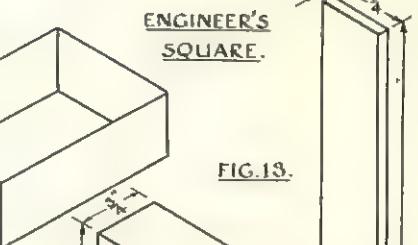
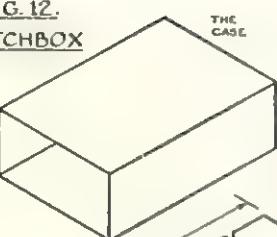
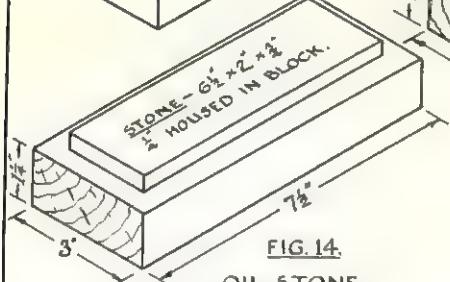
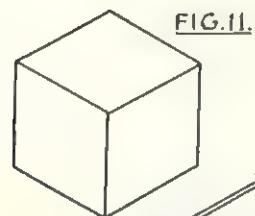
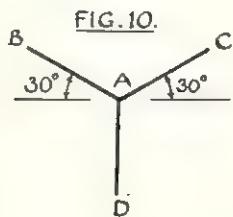
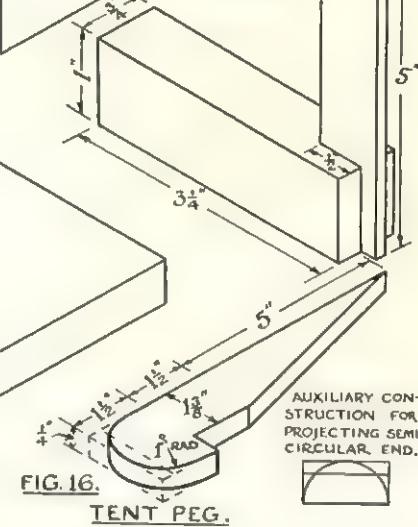
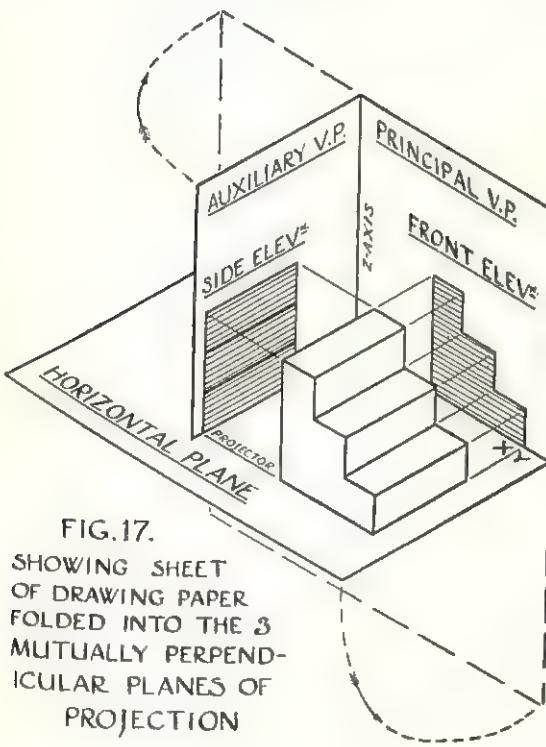
ISOMETRIC PROJECTIONFIG. 15.
MITRE BLOCK.FIG. 16.
TENT PEG.

FIG. 17.
SHOWING SHEET
OF DRAWING PAPER
FOLDED INTO THE 3
MUTUALLY PERPENDI-
CULAR PLANES OF
PROJECTION

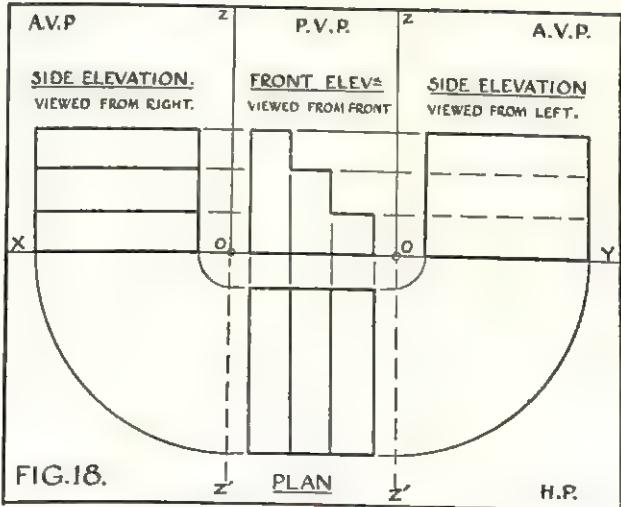


FIG. 18.
ORTHOGRAPHIC PROJECTIONS OF STEPS
(SHOWING PRINCIPAL PLANES UNFOLDED.)

planes, the usual procedure adopted to project the elevations and plan of an object, and concentrate on ensuring that the pupils understand clearly all technical terms used. If this is not attained, progress will be slow, the pupils becoming mere copyists incapable of independent thinking. Models of the simple geometrical solids, such as are employed for model drawing, should be freely used until the pupils have no difficulty in translating a given plan and elevation back to the solid object. The rules of

Line	Name	Pencil	Ink
— — — — —	Principal Construction and Projectors	Firm Faint	Thick Thin
— — — — —	Dimension	Medium	Thin
— — — — —	Dotted (indicating hidden details)	Firm	Thin
— — — — —	Centre line	Firm	Thin
— — — — —	Cutting plane for sections	Firm	Thin
— — — — —	Section (45°)	Firm	Thin

FIG. 19

Types of Lines used in Technical Drawing

If the drawing is at all complicated the centre lines should be marked £.

orthographic projection may be summarized as follows—

1. All projectors are perpendicular to their XY.

2. The elevation of a point gives its height above the horizontal plane.

3. The plan of a point gives its distance in front of the vertical plane.

To determine the plans and elevations of a given solid, apply these rules in the following manner—

From the given point (whether in the plan or in the elevation), draw a projector perpendicular to the XY.

If the elevation of the point is required, find its height above the horizontal plane and mark

it along the projector from the XY. If the plan of a point is required, find its distance in front of the vertical plane and mark it along the projector from the XY.

When the pupils have thoroughly mastered the rules for obtaining projections of simple geometrical solids in easy positions, they may attempt the preparation of working drawings. It must, however, be emphasized that their ideas of projection, though elementary, must be clear and concise, for confused notions in technical drawing—the corner stone of all technical education—can only lead to faulty methods in future work. The following conventional methods are employed to simplify



FIG. 20. SCALE - 1" REPRESENTS 1'. OR
- $\frac{1}{12}$ FULL SIZE.

drawings and thus shorten the time required for their preparation.

SCALES. When the linear dimensions of a solid are being reduced for drawing purposes, it is usual to construct the required scale at the bottom of the drawing paper before attempting to set out the actual drawing. The type of scale shown in Fig. 20 is recommended, e.g. in using it to take off 3 ft. 8 in., place the compass point on A and open until the pencil touches B.

SECTIONS. Sections are projections of an object cut by a knife or plane of infinite thinness in order to obtain a clear view of hidden details. These sectional views are distinguished by shading them with equally spaced lines drawn at 45° to the XY. To indicate adjacent members, the section lines of one piece should be drawn at right angles to that of the other. (See Fig. 22.)

SCREW THREADS. A screw thread is helical in form, produced by wrapping an inclined plane around a cylinder. Professional draughtsmen do not draw these helices, but adopt the following conventional method.

To draw a 1 in. right-hand vee-thread 4 in. long (8 threads per in.), draw a rectangle 4 in. \times 1 in. and mark out the "pitch" by $\frac{1}{8}$ in. spaces along the lower line. On the top line

mark off one space $\frac{1}{16}$ in. from the right-hand end and then mark off the remaining distance in $\frac{1}{8}$ in. spaces. Join these marks as shown in Fig. 21. These sloping lines represent the top of the thread. To obtain the bottom of the thread, draw two faint lines, to act as guide lines, $\frac{1}{8}$ in. from the upper and lower lines; these represent the depth of the thread. Draw dark lines to denote the bottom of the thread midway

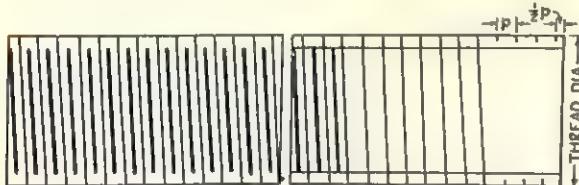


FIG. 21. FINISHED DRAWING.

SHOWING METHOD OF SETTING OUT.

between the lines representing the top of the thread.

Examples in Orthographic Projection

It is suggested that the pupil, in working the following exercises, should not merely copy the complete drawing from the blackboard, but should be encouraged to work out his own solutions from given data. For example, having been given the fully dimensioned front elevation and plan, the pupils should be asked to draw a side elevation or section along a given plane. This practice will develop the power of thinking in three dimensions and also serve as a reliable guide to progress. If drawn to the scale indicated, the examples can be conveniently worked on a quarter imperial sheet of drawing paper (15 in. \times 11 in.).

Drawing office practice varies considerably, but there is agreement on the point that the drawing should be neat, accurate, easy to read, and be a "clear drawing" rather than a "pretty picture." Sufficient dimensions should always be inserted to enable a craftsman to produce the actual job without measuring the drawing.

FIG. 22: OIL-STONE. The four views shown are not really essential in a working drawing, as the front elevation with any one other view would give all necessary dimensions.

FIG. 23: BRICK. F is a "frog" or "kick" to enable the mortar to form a better "key."

FIG. 24: ENGINEER'S SQUARE. Made from three plates. List of materials shown on drawing.

FIG. 25: EYE BOLT. Practice in drawing screw threads.

FIG. 26: RIVETED LAP JOINT. Diameter of rivet is obtained by the formula $1.2 \sqrt{T}$, where T equals thickness of plate.

FIG. 27: BRICKWORK (English Bond).

FIG. 28: BRICKWORK (Flemish Bond).

These show methods of bonding or overlapping bricks so that all vertical joints are broken.

The dimensions of English bricks vary slightly, but for drawing purposes are always assumed to be 9 in. \times 4 $\frac{1}{2}$ in. \times 3 in.

FIG. 29: BEARING. The brass (or gunmetal) bush takes the wear of the shaft, and is easily renewed when necessary. The elongated bolt holes admit of adjustment when the shaft is being aligned. An end elevation and a section along AB are suggested as further exercises.

FIG. 30: BOX SPANNER. An end elevation and section are suggested as further exercises.

FIG. 31: BEVEL GAUGE. This shows the common drawing office practice of disassembling a job and drawing each detail separately. This allows each individual part to be produced by different workmen. It is essential, however, to include in the drawing an "assembled view" to show the location of these details.

In order to obtain a complete working drawing, giving all the information required by the various workshops making these details, it is often necessary to add another drawing showing the manner in which the details are assembled. As it would not be convenient in some cases to draw the details and the assembled view to the same scale, it has become common practice to choose the most suitable scale to enable the details to be drawn quite clearly and the assembled view to a smaller scale.

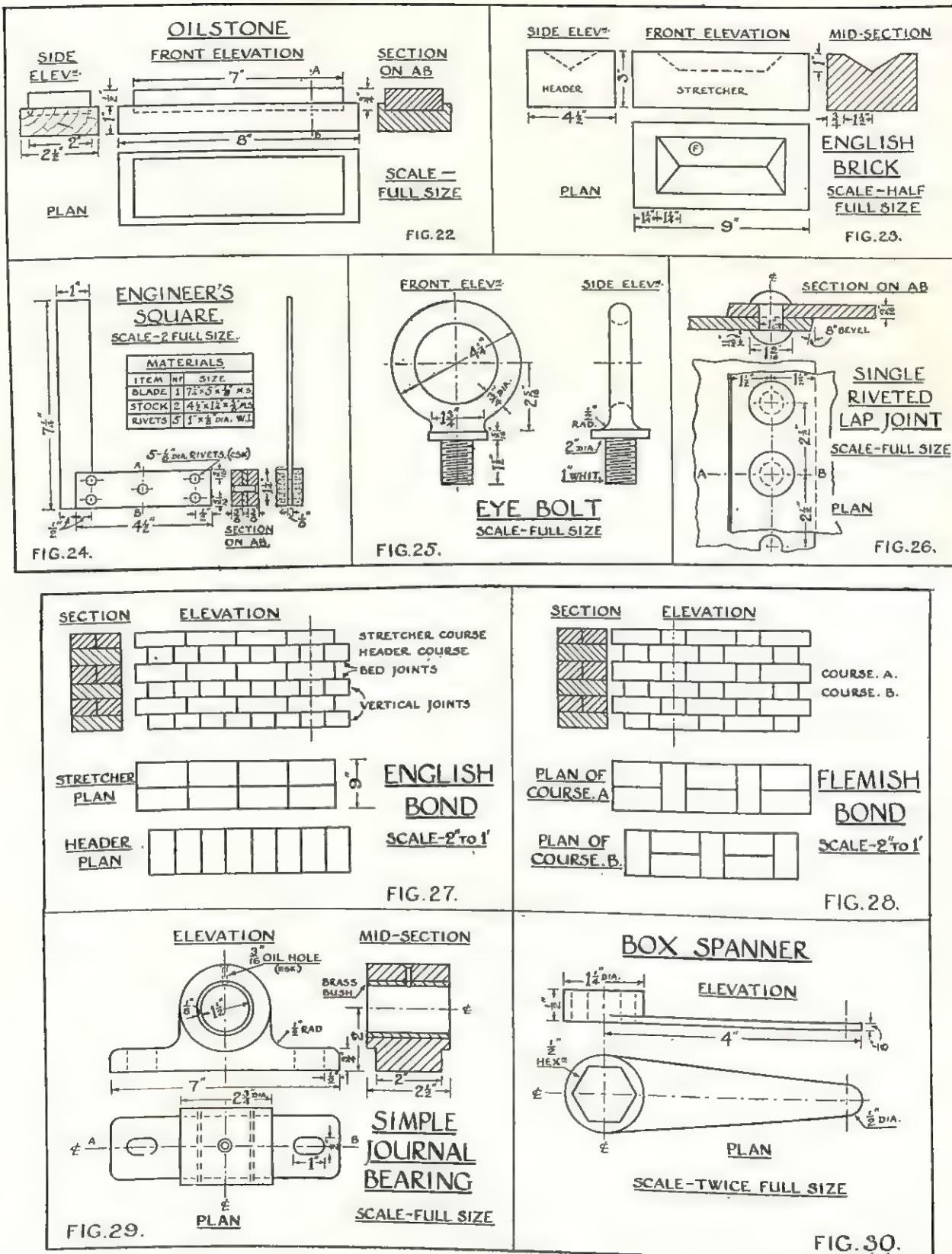
Complete projections of the assembly are suggested as further exercises.

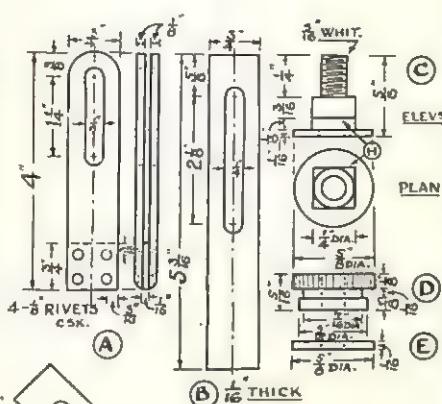
FIG. 32: JEWELLER'S ANVIL. The side elevation and a plan and various sections are suggested as further exercises.

FIG. 33: CRAMP. Gives details of a joiner's cramp; there are various further exercises. Sections A and B show methods of construction.

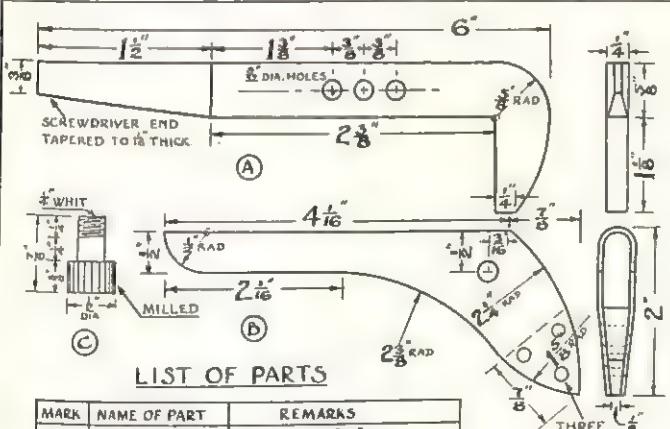
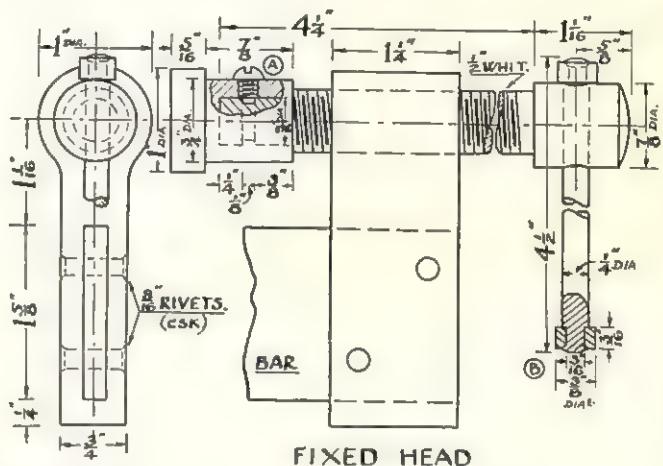
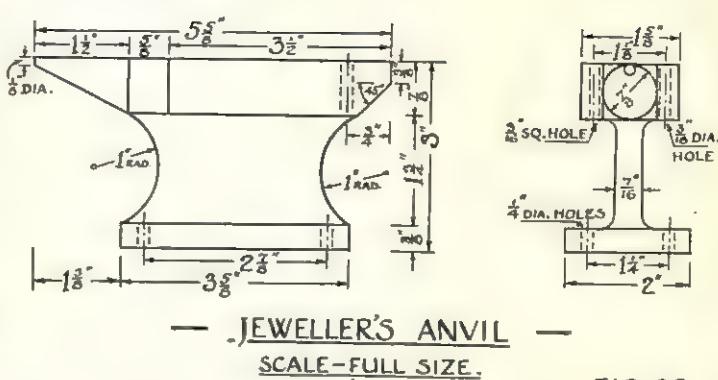
FIG. 34: PIPE SPANNER. Shows the details of a pipe spanner. Further exercises suggested

THE PRACTICAL SENIOR TEACHER



**LIST OF PARTS**

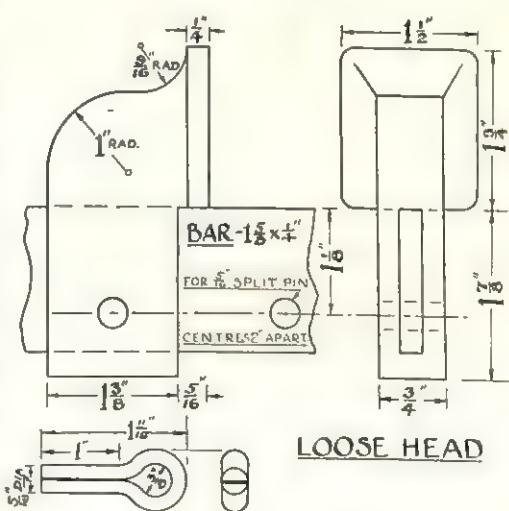
MARK	NAME OF PART	REMARKS
A	STOCK	3 PIECES RIVETED TOGETHER
B	BLADE	TO FIT GAP IN (A)
C	BOLT	SQ. (A) TO FIT SLOT IN (A)
D	THUMB NUT	TAPPED TO RECEIVE (C) & EDGE MILLED
E	WASHER	DRILLED TO CLEAR THREAD ON (C)



MARK	NAME OF PART	REMARKS
A	SCREWDRIVER	FORGED FROM $\frac{3}{16} \times \frac{1}{2}$ BAR.
B	HANDLE	FOLDED FROM $\frac{1}{16}$ SHEET. $\frac{1}{16}$ DIA. HOLE ON ONE SIDE; $\frac{1}{16}$ WHIT. TAPPED HOLE ON OTHER SIDE TO RECEIVE (A)
C	SET SCREW	TURNED FROM $\frac{1}{16}$ DIA BAR JAWS TO BE SUITABLY TOOTHED

DETAILS OF PIPE GRIPS.

SCALE - FULL SIZE.

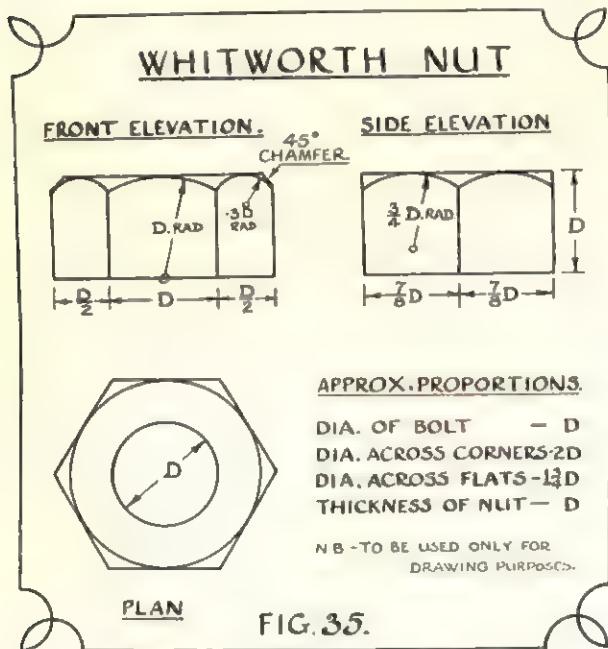
**DETAILS OF SASH CRAMP**
SCALE-FULL SIZE.

are the assembled view and the development of the handle.

FIG. 35: WHITWORTH NUT. This shows the conventional method of drawing the British Standard Nut.

Developments

When the surface of a solid is laid out it is said to be developed and the drawing is known as a development or pattern. This form of



drawing is used for material that is worked on length and breadth and then folded into shape, such as cloth, paper, tinplate, and sheet metal. When developing for practical purposes, it is usual to fit together the various items that make up the development in such a way as to facilitate the construction of the object, and also to obtain a compact shape, thereby enabling it to be cut from a sheet with the minimum of waste. When the pupils have learned the standard methods of developing the simple geometrical solids, they will be ready to tackle the following problems—

Fig. 36 shows the development of a match box. Further exercises: other wrappings, chocolate cartons, etc.

Fig. 37: Foolscap envelope. Further exercises: other envelopes.

Fig. 38: Mug. Further exercises: hexagonal and octagonal mugs.

Fig. 39: Baking Tin. To obtain the development, imagine the tin cut down the joints AB , CD , etc., and the four sides pulled down flat on the horizontal plane. If the plan now be drawn, it will give the development of the tin. Commence with the right-hand side of the tin as shown. Then deal with the *front* in this manner—

Draw two lines ON and LM perpendicular to XY to represent the length of the top edge. Next, with centre B and radius BA , draw an arc to intersect LM at P ; then $BPCD$ is the true shape of the front of the tin. All that remains now is to complete the plan by repeating these two shapes along the remaining edges of the base. If this were an actual job to be produced in tinplate, allowance for joints like BA and BP would have to be made, and also an allowance for finishing off the top edges PC , etc.

"Raw edges" are dangerous; lapped and wired edges are safer to handle and "stiffen" the work.

Further exercises: hexagonal tray, octagonal tray, tapering milk jug, etc.

Fig. 40: Square Vase. The development is obtained in a similar manner to the previous exercise. Imagine the four sides of the vase to be separated, laid out flat and arranged on the horizontal plane. Then, by drawing its plan in this position, the development of one side is obtained.

Fig. 41: Circular Funnel. This exercise is based on the development of the cone. An approximate method of setting out distances along circular arcs is shown by the side.

PROBLEM. To set the circular arc AB along the straight line AC and along the circular arc AD . Arrange the two circles so that AC is the common tangent at A . Divide the arc AB into four equal parts, and with centre at A and radius AE (the first of the quarters) describe an arc to intersect AC at F . Next with centre at F and radius FB describe an arc to intersect AC at H and AD at G . Then the arc AB equals AH equals arc AG (approximately).

Note. This approximation holds good only for arcs not greater than a quadrant.

Further exercise: oil cans.

Fig. 42: Crumb Tray. Allowances for joints and edges to be made as and where necessary.

Further exercises: scoops.

Ink Drawings

When a permanent drawing or one to be used for show purposes is required, it is always inked in. Ready-made Indian ink as sold by the

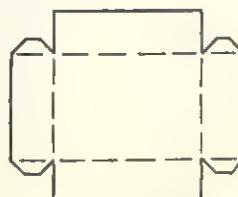


FIG.36. MATCHBOX.

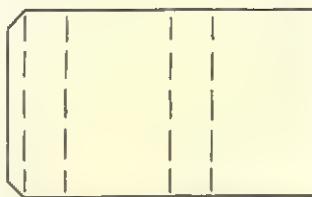
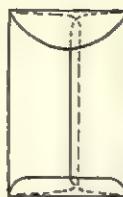


FIG.37.



FOOLSCAP
ENVELOPE

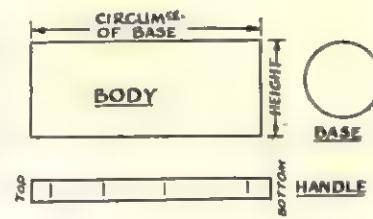
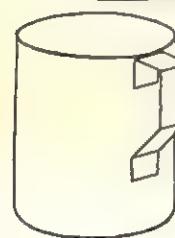
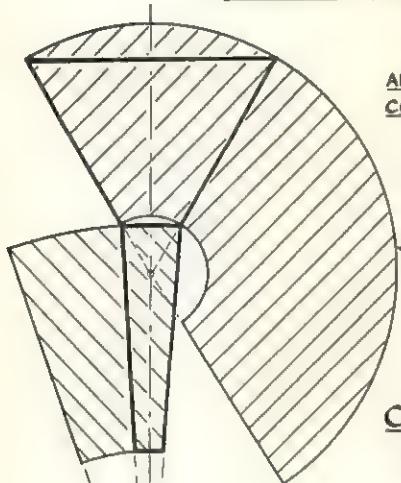


FIG.38. MUG.



APPROXIMATE
CONSTRUCTION.

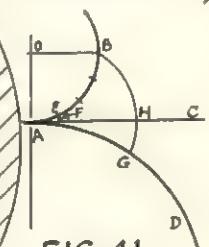


FIG.41.
CIRCULAR
FUNNEL.

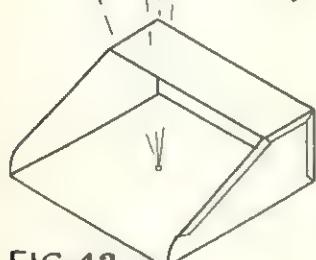


FIG.42.
CRUMB TRAY.

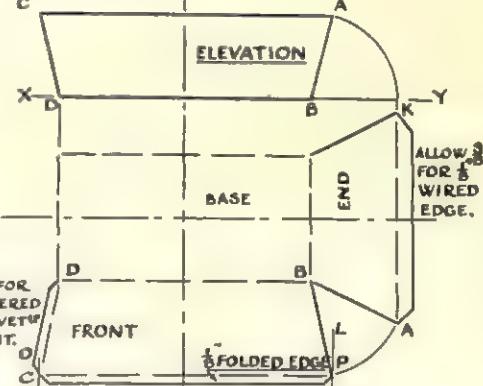
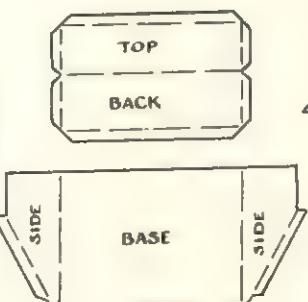
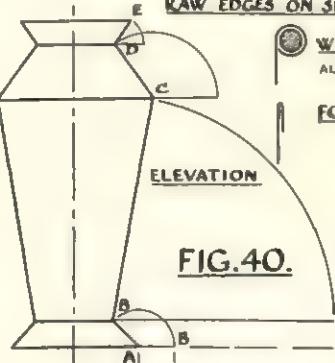


FIG.39. BAKING TIN.

TWO METHODS OF STIFFENING & AVOIDING
RAW EDGES ON SHEET METAL WORK



ELEVATION

WIRED EDGE
ALLOW 3X DIA. OF WIRE

FOLDED EDGE

SQUARE
VASE.

DEVELOP². OF ONE SIDE
4 REQUIRED.

leading artist's material manufacturers is quite cheap and suitable. To obtain the best results the following points should be carefully followed.

First prepare the pencil drawing on good-class smooth-surfaced drawing paper. Ordinary cartridge paper is not suitable for inking. A soft pencil should not be used, as it is inclined to be greasy, thus causing the ink to run unevenly. If the paper be very dirty, it should be cleaned with stale bread in preference to indiarubber, as the bread does not disturb the surface of the paper.

All circles and arcs should be inked before straight lines, working methodically down the

the following procedure is adopted, very few accidents should occur. First of all clear away from the drawing-desk everything except that required for the job in hand, and arrange all instruments on the right-hand side of the board. Never allow the ink bottle on the drawing-board or leave a pen dipped in the bottle. The bottle should be corked when not being used, as the ink thickens when exposed to the atmosphere.

Borders

Fig. 43 shows a few simple corners for use with a border. Up to a quarter of a century ago

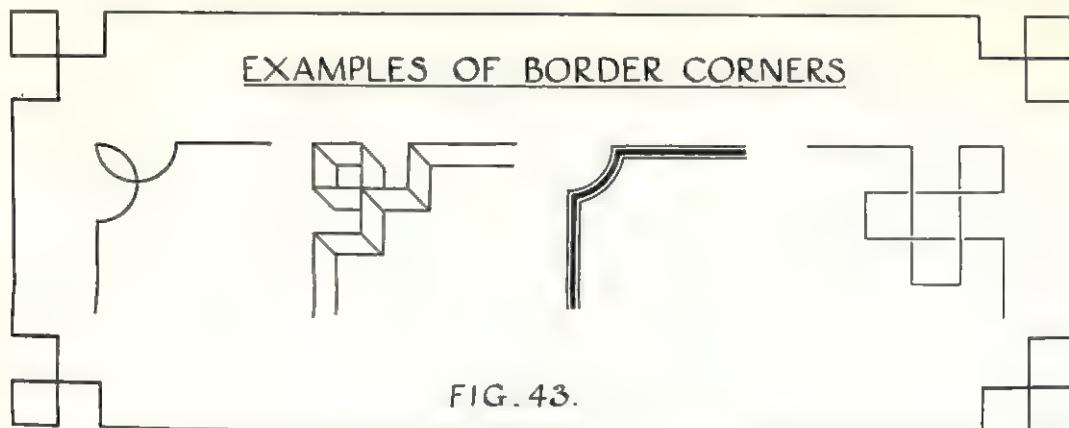


FIG. 43.

paper with the horizontal lines and from right to left with the vertical lines. Next ink in the dimensions and the lettering. The ink lines should be of uniform thickness throughout the drawing, the only exceptions being, of course, the thinner section, centre, and dimension lines.

The correct method of using the drawing pen is as follows. First, clean the pen inside and out (although this should be unnecessary, as all drawing instruments should be cleaned immediately after use). Then, if the ink bottle is not provided with a quill, load the ink between the nibs with an ordinary writing pen. Determine the exact setting of the pen by drawing trial lines until the right thickness is obtained, and do not alter that setting. If lines of other thicknesses are required, use another drawing pen for the purpose.

Accidents are unpleasant occurrences anywhere, and special care must be taken to keep unwanted ink from the drawing. However, if

much care was expended upon elaborate finishing to drawings, but the modern trend is towards simplicity, from the points of view of both economy and general tendency of modern design.

Colouring Drawings

If a drawing is to be coloured, ink it in and clean thoroughly. Then indicate the various materials by flat washes of the colours conventionally used to represent these materials. It is important to remember that the washes of colour must be very faint, for it is not proposed to "paint" the drawing, but rather to "tint" it.

The Indian ink used must be waterproof or it will run immediately the colour touches it. Outside views are indicated by flat washes, sections by a slightly darker wash of the same colour.

When preparing show drawings, it is usual to

use red ink for the centre lines and blue ink for the dimension lines.

Conventional representation of materials—

Cast iron	Payne's grey
Wrought iron	Prussian blue
Steel	Prussian blue and crimson lake
Copper	Crimson lake and burnt sienna
Brass	Gamboge
Lead and white metal	Indigo
India rubber and leather	Sepia
Softwood	Raw sienna
Hardwood	Burnt sienna
Stone	Sepia and yellow
Brick	Crimson lake
Slate	Payne's grey and prussian blue
Earth	Indian ink and burnt sienna

Copying Drawings

When drawings for a project are completed, the original is filed for reference and copies are prepared for use in the workshop. There are several methods of copying drawings, varying with the apparatus available and the use to which it is intended to put the copy. The most common method employed is photo copying, a process very similar to that used for obtaining prints from ordinary photographic plates and films.

The following is a brief account of the "Blue Print" process, one of the simplest of these photo-copying methods, and quite suitable for use in schools.

First a negative is obtained by making on paper or cloth an inked tracing of the drawing. Tracing paper is cheaper than cloth, but is not so easy to use.

A printing frame can be easily adapted from an ordinary picture frame by replacing the back board with a movable hinged back made from plywood held in position with two brass clips, as shown in Fig. 44. The negative should be placed face downward on the glass, and the sensitized paper face downward upon the negative; then secure the back in position with the brass clips. Expose the frame to sunlight, arranging it so that the direct rays fall on the glass. The time of exposure varies from 5 min. on a bright day to 45 to 60 min. on a very dull day. The progress of exposure can be judged by the colour of the sensitized paper,

which becomes a greenish yellow when sufficiently exposed (note: it is better to over- than under-expose). The print is developed and fixed by washing for about 10 min. in running water. A good print has clear white lines on a dark blue background. After washing, the print should be dried by pinning one end to, say, the edge of a shelf, so that the air can circulate on both faces. If the paper comes into contact with any object during drying, it is almost sure to stain. After drying, the print can be mounted as required, and if subject to heavy use it should be coated with clear paper varnish.

The sensitized paper can be bought quite cheaply and is known as Ferro-prussiate Printing Paper, but, if desired, the paper can be readily prepared in the following manner. Prepare the following solutions in separate bottles. First, Ferric Ammonium citrate (green) 100 gr., Citric

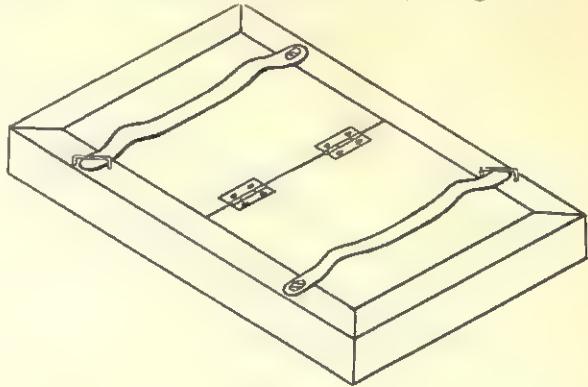


FIG. 44
Picture Frame adapted for Use as
Printing Frame

acid 20 gr., and water 1 oz. In the second bottle, Potassium Ferricyanide 40 gr., water 1 oz. When it is required for use, mix equal parts from each bottle, filter, and apply uniformly to the paper with a smooth brush, then hang the paper to dry in a *dark room*.

Freehand Sketching

Pupils taking a course in technical drawing should be constantly encouraged to make freehand sketches, but it must be remembered that the type of freehand drawing used by the engineer, architect, and skilled-craftsman is not

the picture of the artist, and ability to make a good sketch depends entirely on the pupil's knowledge of the rules and conventions of technical drawing. The first drawing of any piece of work is usually a freehand sketch, from which the finished working drawing is prepared: hence the necessity for clear and intelligent sketches. Oblique and isometric projections can be used for preliminary sketches, but it will often be found that the plan, elevation, and section are more satisfactory guides for preparing finished drawings.

Squared paper is the most suitable material for sketching, and the subjects suggested are common tools, doors, windows, articles of school furniture, and small details of the school building. The sketches must always give sufficient detail and dimensions to enable a complete working drawing to be prepared without further reference to the actual object.

Suggestions for Advanced Work

The authors do not advise attempting more ambitious work in this subject without an adequate equipment of suitable models. These afford excellent training in accurate measurement and hand sketching, in addition to providing material for short talks, formal and informal, on many technical topics which are a never-ending source of inspiration to boys. The handling of the actual model is to be preferred in all respects to the mere copying of drawings from books or blackboard. The latter method, no doubt, lends itself to the production of nicely finished drawings, but their educational value is questionable. It must be borne in mind that the aim of teaching Technical Drawing in Senior Schools is not to produce draughtsmen—the task of the professional Drawing Office and the Technical Institutes—but rather, in common with all other subjects of the curriculum, the harmonious development of brain and body, more particularly in inculcating habits of neatness and accuracy, together with a spirit of self-reliance and initiative in approaching new problems. Moreover, it would not be out of place to stress the dignity of good craftsmanship.

The collection of a useful set of models need

not be expensive—a valuable friend will often be found in the local garage proprietor, while much excellent material may also be found in the yards of various scrap-iron merchants.

Many useful contributions to the authors' collection have been supplied by enthusiastic pupils, whose intimate knowledge of local conditions has resulted in the acquisition of almost unbelievable "bargains."

In a school well known to the authors an old lathe, condemned after many years of faithful service, was secured and made the subject of group work in the Technical Drawing lessons. It was dismantled by the pupils and parts were apportioned between them to facilitate the assembly of the finished drawings. Rough hand sketches were prepared and numbered as in a professional drawing office. Next, complete working drawings of each detail were prepared from the sketches, and finally two pupils worked simultaneously on a large-scale drawing of the complete machine; this drawing was inked in to render it permanent. Although the finished work was not to be compared with a professional production, it was nevertheless a very valuable piece of group work.

Conclusion

There is a movement in modern education towards craftwork, and all craftwork depends first on "the drawing"; so where prominence is given to handicrafts, technical drawing must naturally take an important place in the curriculum. Technical drawing is itself a form of handicraft, in that it requires accuracy of observation and tool manipulation, and develops co-ordination of hand and eye. As a means of expressing ideas or conveying ideas from one person to another it is unrivalled in economy and precision. It has indeed been referred to on more than one occasion as "the shortest of shorthand" and "the language of the craftsman." The importance of drawing is indicated by the fact that the modern workshop, in spite of tremendous advances in all other directions, has not been able to dispense with working drawings, although actual drawing has been shortened by conventional methods of representation.

PRINTING

THE many advantages of printing in schools have hardly been realized, for the subject has not been generally recognized as a practicable one, partly perhaps because of cost (which we shall see is not at all prohibitive), and because of an exaggerated idea of its difficulty—whereas it can be easily done by boys of twelve.

And as it may be turned to such valuable use in innumerable ways for various other school subjects, and as it is the most direct means of linking up English and Handwork, it is most worthy of careful consideration.

The primary difficulty with this subject is the cost, but once the initial amount for the purchase of press and type has been raised by donations, school concerts, etc., the work may be made to more than pay for itself. With £3-£4 quite a good start can be made, but it is advisable first to decide what printing is to be carried out. If the work is to be limited to small formes—words of songs, poems, etc.—a small press will serve and not much type will be required; but if it is proposed to produce a school magazine and various booklets, a larger press and several pounds of type will be necessary. Various suggestions for class use of the press are contained in a later section of this chapter, and the imaginative teacher will easily think of dozens more, so, when it has been decided what types of work are to be undertaken, a selection may be made from the various materials now to be described. Some of these may be made in the handicraft lessons, and some may be obtained as ordinary school requisitions.

Materials

THE PRESS

This is, naturally, the most costly article, and, as so much depends on it, the best possible should be obtained. It consists chiefly of:

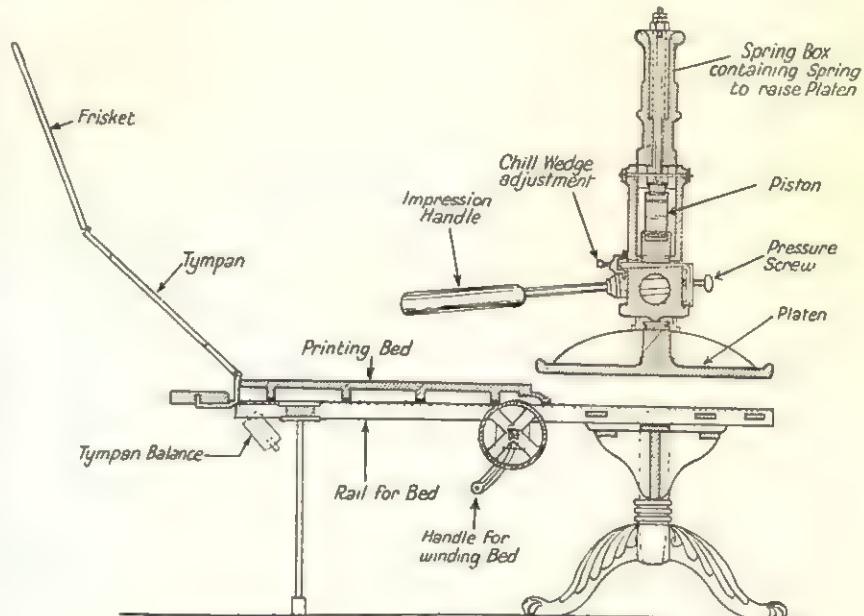


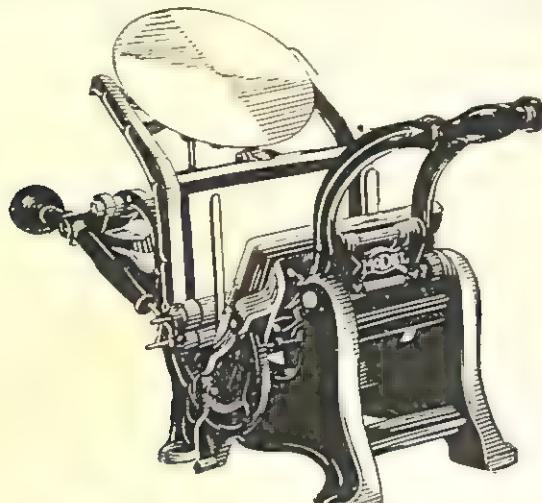
FIG. I
Diagram of Hand-Press

frame to hold very firmly the chase containing the type; an ink plate over which rollers pass to the type in order to cover it with a thin film of printer's ink; a platen on which the paper to be printed is placed; and a powerful lever which presses this platen against the type.

The old-fashioned hand-press is still one of the best for individual work, and one similar in principle to that shown in Fig. I is used even now for producing some of the best work. It is rather costly new, but second-hand ones may sometimes be obtained.

A more compact machine is shown in Fig. 2. This kind range upward in size from a 2 in. \times 3 $\frac{3}{4}$ in. type space at £3. This, although much

use may be made of it, is not large enough for all the work you will want to do as the subject progresses, and one covering a 5 in. \times 7½ in. type space (at £10) will prove more serviceable,



By courtesy of

Excelsior Printers' Supply Co., Ltd.

FIG. 2
Model Hand-Press

while a size larger will be even better. The Adana Agency supply a very cheap machine for 45s. on which any amount of serviceable work may be produced. This press (Fig. 3) takes a comparatively big chase of 7 in. \times 4½ in., but naturally it cannot produce all the work at such a high standard as the much more expensive presses. The platen is not adjustable, but has to be packed with card or stiff paper until the impression from the forme is even, and the power is a simple leverage actuated by pulling down the arm with sufficient strength to get a good impression—the more type in the chase, the more pressure required.

In the other machines the pressure by means of a toggle joint is very powerful without much effort, and can be adjusted so that it stops just at the right moment to give a perfect impression, this being done by means of set-screws behind either the platen or the bed.

It is hardly necessary to state that whichever press is chosen should be thoroughly examined and its working understood before use, and carefully guarded against ill usage. It will stand any amount of legitimate hard wear if all bearings are kept oiled and all parts kept clean.

TYPE

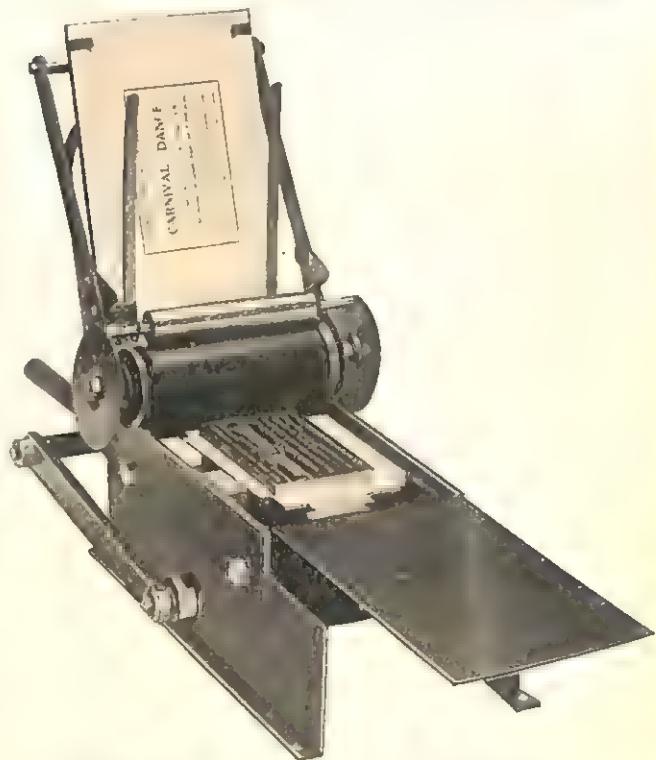
The perusal of a catalogue of type may perhaps bewilder the beginner, but of the many varieties shown only a few are suitable for school work.

First comes consideration of size. Although small type will allow more words to the page than larger type, yet the latter will be much easier to handle. Type is now measured in points—72 points to the inch—while the standard is the pica *em* of twelve points. Thus we have—

12 points = 1 pica.

6 picas = 1 inch.

For the main work 12 pt. type will be most suitable, as it is large enough to handle easily but does not look large in print. However, if you wish to do close work 10 or 8 point type



By courtesy of

The Adana Agency

FIG. 3
The Adana Press

may be obtained, while a little 6 point is useful for odd jobs.

Type is sold in fonts of various sizes—the larger ones measured by weight. Each font consists of letters, figures, punctuation marks,

etc., in the proportions in which they usually occur on the printed page (see E. A. Poe's *Gold Bug*).

With regard to style of type, as there are now many new faces on the market it would be advisable to choose something clear and artistic, so that the work may appeal to the eye. The most usual type is Roman or Old Style, which has large or small caps., italics, and a bold variety,

36 pt. Old Face

24 pt. Imp. Shadow

18 pt. CHELT. BOLD

12 pt. CHERTENHAM BOLD

12 pt. Baskerville

FIG. 4
Type Faces

and is therefore necessary for dramatic work (as it is set out on p. 244 of the PRACTICAL SENIOR TEACHER, Vol. I), but for straightforward work a new face such as that shown in Fig. 4 may be obtained. For titles the capitals of the type used in the body may serve, but it will be useful to have fonts of one or two larger faces. The best way will be to get one or two printer's catalogues and obtain what is wanted as required. Here are a few suggestions—

FOR PRINTING A SMALL SCHOOL MAGAZINE, ETC.—

12-point Cheltenham O.S.; Old Style Roman; Baskerville; or similar:	s. d.
6 lb. @ 2s. 4d.	14 -

OR A SMALLER TYPE FOR MAGAZINE, PLAYS, ETC.—

10-point, 5 lb. Cheltenham O.S. @ 2s. 8d.	13 4
10-point, small font Cheltenham O.S. Italic	4 -
10-point, small font Cheltenham Bold	4 -

FOR TITLES, ETC., ONE OR MORE OF—

Small font 6-point O.S. or other	3 -
Small font 12-point Cheltenham Bold	4 -
Small font 24-point Cheltenham Bold	8 -
Small font 36-point Old Face	10 -
Small font 24-point Imperial Shadow	8 -

Fig. 4 gives examples of these faces. For use with the type there must necessarily be spaces of various sizes. They may be bought mixed in packets: a large amount for the chief type used. Thus (as required)—

	s. d.
2 lb. 12-point quads (large spaces)	1 2
2 lb. 12-point spaces	2 -
2 lb. 10-point spaces	2 4
2 lb. 10-point quads	1 4
1 packet 6-point quads and spaces (mixed)	1 -
1 packet 24-point quads and spaces (mixed)	1 -
1 packet 36-point quads and spaces (mixed)	1 -

Other Equipment

Other materials which must be purchased are—

	s. d.
1 length (24 in.) 1½-point brass rule	2 ½
1 length (24 in.) 1½-point brass rule (dotted)	4 ½
2 lb. (18-inch lengths) 1½-point leads	1 4
2 lengths (36-in.) 36-point furniture	6
2 lengths (36-in.) 18-point furniture	4
2 lengths (36-in.) 12-point furniture	3
2 lengths (36-in.) 6-point furniture	2
½ lb. black ink	9

TYPE CASES

The type must be kept in proper cases (or trays), which may be made in the woodwork centre. Those for capitals (upper case) consist of equal divisions, but the lower case (for small letters) is unequally divided, and the letters should be arranged for convenience in setting up type. It would be best to have all the trays

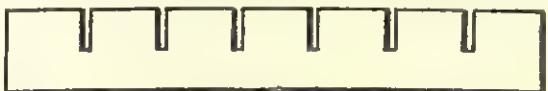


FIG. 5

of the same size so that they may be kept in a rack (which may be extended as the amount of type increases). 12 in. × 9 in. is a convenient size for the cases, which should be 1 in. high. Fasten the bottoms on very firmly, for the type is heavy. The divisions may be marked off on thin strips of wood and cut to join together as in Fig. 5. For a small font two trays may be used, with the caps. at the top of each as in Fig. 6, but for the large font for body work three trays will be necessary: one upper case (for caps.) and two lower cases (small letters) (see Fig. 7).

Mark the cases as shown, and when the type is obtained unpack it carefully, as the letters

is mixed up it becomes "pie"—the bugbear of the printer! Also, do not throw the type into the cases, for careless handling may easily injure the delicate faces. It may be mentioned in passing that several interesting lessons may be given on type, the history of printing, modern machinery, paper, ink, and so on.

A	B	C	D	E	F	G	X	Y	Z	Æ	Œ	U	J
H	I	K	L	M	N	O	1	2	3	4	5	6	7
P	Q	R	S	T	V	W	8	9	0	£	&	/	"
k	:	æ	œ	;	j	e	.	?	l	—	[]	()	fl
z	b	c	d				i	s	f	,	g	ff	fff
x	l	m	n	h			o	y	p	w	,	en spaces	em spaces
q	v	u	t	thick spaces	a	r	mid. spaces	thin spaces				quads	

FIG. 6

Two Trays for a Small Fount (Font) of Type

are all arranged in order and may be easily removed to their proper divisions. Once type

Fig. 8 (p. 279) shows a chase containing type surrounded by the necessary furniture and held

A	B	C	D	E	F	G
H	I	K	L	M	N	O
P	Q	R	S	T	V	W
X	Y	Z	Æ	Œ	U	J
1	2	3	4	5	6	7
8	9	0	£	&	/	"

k	:	æ	œ	;	j	e	.	?	l	—	[]	()	fl
z	b	c	d				i	s	f	g	ff	fff	
x	l	m	n	h			o	y	p	w	,	en spaces	em spaces
q	v	u	t	thick spaces	a	r	mid. spaces	thin spaces				quads	

FIG. 7

Three Trays for Body Type

in by quoins. If you have only a small machine, a screw chase may be used in which the type

square form is more pleasing to the eye if such a paper can be obtained. In any case, see that there is a good margin round the letterpress.

LEADS

When the most useful length of line has been decided, some of the leads and brass rule may be cut carefully with a pair of tin snips to that length and kept in a separate tray. The furniture will be required to furnish the chase or to put in between the lines of type when a space is required. (The narrow furniture is called reglet.) This can be cut into lengths with a tenon saw. The brass rule is used for underlining a title, printing ruled forms, etc.; while the leads are for opening out the lines of type. The type may be close set, but it will be found much easier to work with a lead between each line, while two or more may be inserted where required.

As the printing work develops it will be found very convenient (and even a necessity) to have various lengths of lead for various jobs, with brass rule to match.

THE COMPOSING STICK

Type is "set up" in a stick, which is a little three-sided tray. A metal one adjustable in length will cost about 7s. new, but a fixed wooden one may be easily made. All the angles must be exactly 90° , and if the sides are glued and screwed to a

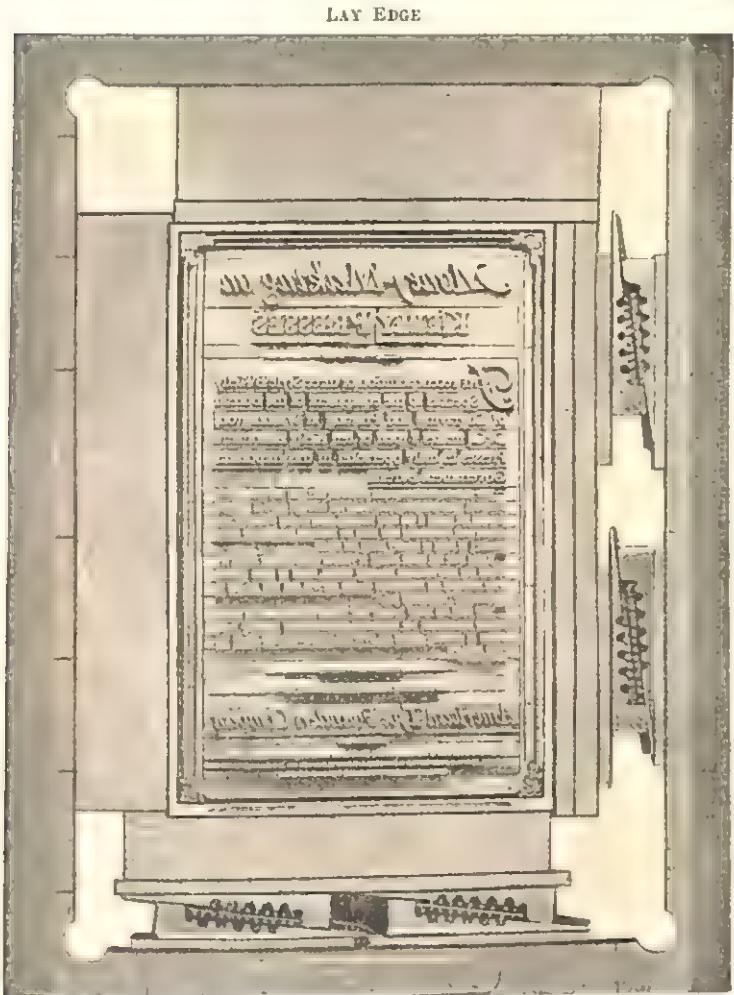


FIG. 8

*Type, surrounded by Furniture, and held in Chase
by Iron Quoins*

may take almost the whole space, it being held in place by strips of iron tightened up by screws in the sides of the chase.

PAPER

Another consideration is the size of paper available. If it is the foolscap quarto usually supplied to schools, we shall have a sheet which, folded, is $6\frac{1}{2}$ in. $\times 4\frac{1}{4}$ in. If a margin is left round the letterpress, this gives us a type surface of about $5\frac{1}{4}$ in. $\times 3$ in. This is a convenient size for boys to work to, although a rather more

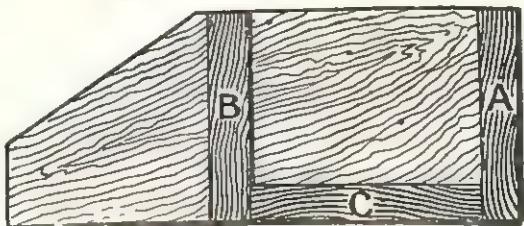


FIG. 9
A Composing Stick

three-ply base they will be quite rigid. Make it to take the brass rule and leads already cut;

they must fit snugly without jamming (see Fig. 9).

An adjustable stick should be set (each time it is used) to an exact number of *ems*, the correct way to do this being to fit the actual number of

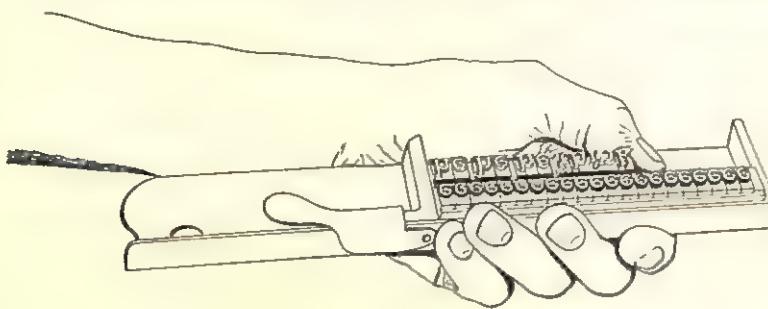


FIG. 10
How to Hold the Composing Stick

ems required in the stick, and then adjust it exactly before removing them (see Fig. 12).

THE GALLEY

When a few lines have been set up in the stick, they are transferred to a shallow tray with a perfectly flat bottom. This is a galley, and it will be best to make it big enough to take the chase and to arrange the type among the furniture as the work proceeds. (As in Fig. 8, but with the quoins loose.)

AN IMPOSING SURFACE

This is a perfectly level and solid plate of slate or iron on which the forme is placed before being put in the press, so that the type may be tapped down to a dead level. A piece of hard wood will serve, but a piece of thick plate glass will be better. Get a piece about 10 in. × 8 in.; glue a piece of brown paper on one side of it, and then glue this paper to a thick flat piece of wood. This will give an almost unbreakable surface. When the type from the galley is slid on this the wedges are loosened a little, and a flat piece of wood about an inch thick is placed on top of the type and tapped with a mallet so that the surface is "planed" level. This piece of wood is called a "planer." (But do not slide it over the surface of the type.)

THE QUOINS

These are wooden wedges, which may be purchased cheaply, or home made. Patent ones cost about 9d. each and are safer. Hempel quoins are shown in Fig. 8. Do not quoin up too tightly or the chase will be forced out of shape.

Composing

SETTING

When setting up type, place the trays conveniently on a sloping desk and hold the stick in the left hand (as in Fig. 10). Place a piece of brass rule flat against the lower side of the stick. On this the type is placed upright with the nicks away from the compositor.

Start at the left-hand side so that the words go in the usual way from left to right but are all upside down. The type has one or more nicks on one side, and this is placed face upward in the stick—in the positions shown in Fig. 11. Here are shown those characters that cause difficulty owing to the fact that some letters

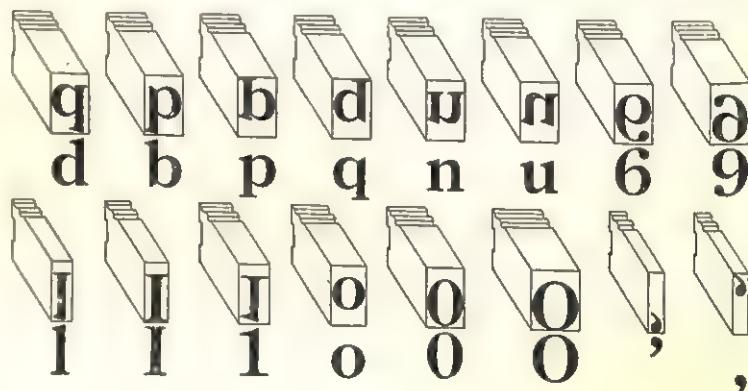


FIG. 11
Type of Deceptive Characters

are merely reversals of others. Hence "Mind your p's and q's."

Suppose the title PRINTING is required. Pick the letters one by one from the upper case in proper order and place them in the stick. The word must be in the centre of the line, so we take quads (the biggest spaces) and place the same number and size on each side of the letters until the line is tight in the stick. Probably this

cannot be done with quads alone, so smaller spaces are used, keeping them in pairs, one of each on each side of the title. If there is only room for one space, which will make the title nearer one end of the line, a big space must be

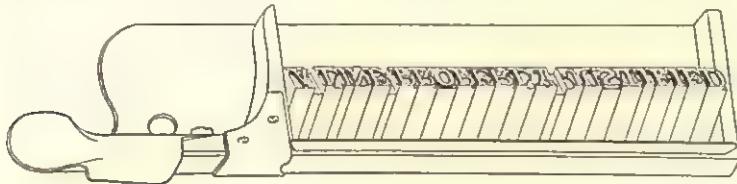


FIG. 12

The Stick with a Complete Line of Type which, when tilted upward, will remain in Position

removed and small ones substituted so that they can be divided equally.

The square space is called the "em" (whatever the size of the type).

Quads are two, three, or four cms long.

The en is half the em.

The thick space is a third of the em.

The middle space is a quarter of the em.

The thin space is a fifth of the em.

Make the line exactly fit the stick. It must not be really tight or it will not be removable without a struggle, but it must not be slightly loose or difficulties will arise later (see Fig. 12).

On this line place a lead and on this set up the next line. When a word is finished, place a thick space and then set the next word, and so on to the end of the line. The last word of a line (except at the end of a paragraph or in poetry, etc.) must come at the end of the stick, and as this will rarely happen with a thick space between each word the line has to be *justified* in the following manner.

JUSTIFICATION

When, say, seven words have been set up, there may be about $\frac{1}{2}$ in. left. An em space must not be inserted there or between any two words, but thin spaces may be placed between the words—preferably those that end or begin with a tall letter (ascenders)—until the line is full. On the other hand, it may not be possible to insert the last one or two letters of the last word of the line. In this case some

of the thick spaces between the words are removed and middle or even thin spaces substituted—again having the biggest spaces next to "ascenders." This is done because the height of these letters counteracts the extra size of the space, and it is the aim of justification to make all the spaces appear regular.

On each line place a lead before continuing, and, when five or six lines (less to begin with) have been composed, a brass rule is placed on top and the whole removed to the prepared chase. Place the stick by the galley, grip the two outside brass rules between the fingers and

thumb of each hand, and slide the whole up to the top of the stick. Then lift it out gently, placing the crooked second fingers at the sides of the lines as they leave the stick so that no end letters may fall out. Then turn the hands up so that the type—lying horizontal—faces you, when it may be moved about in safety (as in Fig. 13). Lower it gently into place in the galley, which may be tilted up with a piece of wood at the farther end. Continue setting up in the stick and removing to the galley, and when the page is finished it may be quoined up

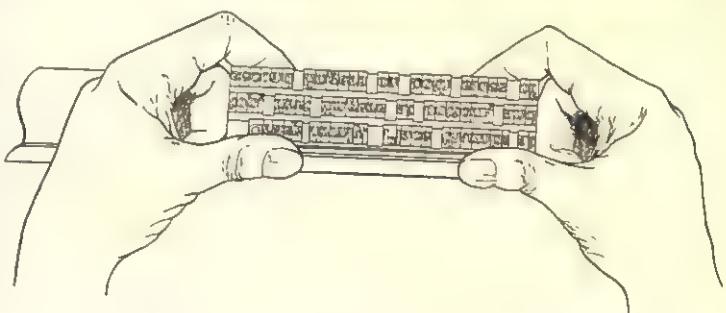


FIG. 13
Removing Type from the Stick

and a proof taken, for which purpose a small sheet of glass, some printer's ink, and a small hand roller or a good solid inking pad will be required.

Taking a Proof

Place a very small portion of the ink on the glass and roll or dab it out to a thin film. Then

apply roller or pad to the type so that it is evenly and *thinly* covered. Make a proof planer by covering a flat piece of wood—about the size of the chase—with several layers of blotting paper. Place a sheet of soft paper over the type, on it place the planer padded side down, and tap it smartly with the mallet. When the paper is removed a readable proof should be obtained.

PROOF-READING

Read through the proof letter by letter, comparing it with the original, and mark every mistake clearly and suggest improvements in spacing, etc. Any method of marking will do, but it will be more business-like to keep to the orthodox signs as given in most dictionaries.

CORRECTIONS

Remove the chase to the imposing plate: loosen the quoins so that alterations may be made, and, when wrong letters are lifted out with tweezers, grip their sides and take care not to touch the faces of the type. Any letters upside down are easily reversed, but those that have to be changed may cause some difficulty. In no circumstances must the length of line be altered even by a hairbreadth. Many letters are the same thickness, and these may be altered with ease—*b* for *d*; *n* for *u*; and so on. If a thin letter is to be substituted for a thick one a space must be added to the former to make the exact thickness of the latter. Then insert the letter in its place, while the space may be placed in the best position in the line.

If a thick letter is to take the place of a thin one, the latter is removed with one or two extra spaces which were put in to justify the line in setting up: this letter and space (or spaces) must be equal to the size of the thick letter to be inserted. If there are no spare spaces to remove, take out some of the thick spaces between the words, place them with the removed letter, and then get a number of thin spaces with the right letter so that their thicknesses correspond. Then insert the letter and the spaces as required.

If there are several mistakes in a line, it is best to remove it and reset it in the stick. If some words have been repeated or omitted it

will be necessary to reset the two or three lines involved, spreading out the words in the first case and closing them up in the second.

If a line is wanted under the title, a piece of brass rule (which is type high) is inserted, and if a space also is required a few leads or a piece of reglet may be inserted.

When all the corrections have been made the quoins are tightened and the forme planed. When carrying a full chase hold it upright by the two corners, and the forme then will be in no danger of collapsing.

Printing

Ink the inking plate of the press *very thinly* with the hand roller or dabber, and then run the machine rollers over it several times so that the ink is evenly distributed. Place the chase in position, and then make certain that the gripper fingers are clear of the type or they will cause irreparable damage. Cover the platen with sufficient packing and then press it against the type. When the machine is opened an even impression should be seen on the top sheet of packing.

An impression that is heavier in one part than another indicates that some adjustment is required. With the Adana press the packing must be made thinner if the impression is too heavy near the hinge, and thicker if it is too light there. With the Model press it is only necessary to adjust the setscrews behind the platen.

Have plenty of scrap paper for taking proofs, so that the job may be thoroughly prepared before printing off. Examine the back of the proof. If the type is pressed through the paper the pressure on the platen must be lessened until only a good surface impression is obtained. It may happen that one or two light spots may show; and if this is not due to uneven inking, patches of tissue paper may be pasted on the top sheet of the packing in order to make it a little thicker at those places. This is known as "spotting up," and should rarely be necessary. If one side of the letters prints less than the other the type is "off its feet," and the chase must be removed to the imposing plate and re-quoined up perfectly square.

Before printing it is necessary to mark off on the platen covering where the clean sheets of paper are to be placed. Then glue a strip of card at the bottom mark, and a strip down one side, so that the paper may be placed on one and against the other. Insert a couple of pins in the bottom strip to prevent the paper from slipping out, and shift the gripper fingers so that they come to about $\frac{1}{4}$ in. of the type. Then paste a thin sheet of paper over the impression on the packing. The printing may now be done, and the sheets placed out to dry as they are taken from the machine.

Distributing

The simplest way for children to "diss" the type is to place the chase in a galley, put it on the desk by the type case, loosen the quoins, and then lift up two or three words from the beginning of the top line between the finger and thumb of the left hand. Then, *reading* the words, take each letter with thumb and finger of the other hand and place it in its proper division. It will be useful at first for the distributor to have a proof of the forme he is working on, as bad distribution causes much subsequent trouble.

The type must of course be cleaned before distribution, and it should be made a rule to clean every forme as soon as it is removed from the machine. A piece of rag moistened with petrol is the best cleanser; keep it in a tin box away from all flame. Paraffin may also be used.

Setting Up Forms

The press will be very useful in producing forms of various kinds. For these the type is

set up in the usual way, and then opened out with reglet or furniture as necessary. If they are to be printed on lined paper the type may

Date Name

Title of Book :-

Author :-

Chief characters :-

Period :-

Place :-

Other books by this Author I have read :-

Other books by this Author I should like to read :-

FIG. 14
Form for Reading Record

be adjusted accurately by the use of leads, and care must be taken to place the papers accurately on the platen as they are printed.

Work may be done on plain paper as in Fig. 14, while brass rule may be used in other cases, as shown in Fig. 15. In the latter set up title and centre it. Then set up the next line with no

ARITHMETIC

Week Commencing	Mon.	Tues.	Wed.	Thurs.	Fri.	Total	%
.....
.....
.....
.....

FIG. 15

spaces and see how much space is left in the line. Divide this distance equally into the number of spaces required and insert the correct number of quads and spaces between each word so that the line is full. The first part of the line consists of two short lines of 6 point. Make them of even length and then continue with 12 point type and spaces.

Place a lead between each line as set up, and when finished remove to the galley, where the lines may be opened out and the brass rule and

only one page at a time can be printed. For such a work it is best to prepare first of all a "dummy" copy, this consisting of the proper number of pages with their contents written on each, thus serving as a guide as the work progresses.

When preparing for the printing of each page always measure from the top and inside edges of the page. Then when the book is stitched up and the bottom and outside edges are trimmed the margins on the pages will be similar.

SUMMARY

Arithmetic
English
Reading (a)
Reading (b)

No. Right	
No. Worked	
Total Marks	
No. of essays	
Total Marks	
No. of books read	
Total Marks	
No. of books read	

FIG. 16
A Summary Form for the Mark Book

furniture inserted and as many lines (of brass rule) added and spaced with furniture as required.

Fig. 16 shows a summary set up in 24 and 12 point type where the chief titles *Arith.*, etc., are set up at the beginning of the line and continued with quads until the sub-titles *No. Worked*, etc., are required, and these are set up in two lines of 12 point so that the whole line is justified.

Producing a Booklet

The two illustrations, Figs. 15 and 16, are from a small book, in which each pupil may enter up his marks for the term. It consists of several pages, and it is obvious that on a small machine

If the machine will take two pages of a small booklet it will be necessary to set up the first and last page together, then the second and last but one, and so on until the two middle pages are reached.

Spacing

The spacing between words has already been mentioned. After the full stop, exclamation and interrogation marks an *em* space is generally used, but some printers prefer a smaller space. The colon and semicolon are preceded by a thin space and are followed by an *en* space. With inverted commas the first pair are followed by a thin space, and the second preceded by a thin space unless there is a full stop or comma. Let

the pupils examine a well-printed book and observe these rules for themselves. They will also in this way get useful information on displaying their work to the best advantage.

Additional Materials

Brass Rule will be found very useful. It may be used on either edge, the most usual kind giving either a thin or thick line. Then there is a dotted and fancy rule, the latter giving wavy lines, small squares, and so on. Wooden rule is used for wide borders.

Borders are also made up from ornamental type, which may be obtained in various sizes and styles. Some of this type may be used to set off a title, and variety may be obtained by placing an em (or other size) space between each ornamental unit.

Ornaments of large size (including fancy initials, birds, flowers, etc.) may be purchased as required. Like borders they are not necessary but add interest and variety and encourage the artistic side of printing.

Stereo Blocks also have their value, as they give what cannot otherwise be obtained—outline sketches.

Lino Blocks may be used freely in the press if they are glued on perfectly flat wood so that they are type high. The edges must be accurately squared so that the block will quoins up securely, and small blocks may be inserted in the letterpress. If it is found that the block does not print fully it may have one or two pieces of paper pasted on its base in order to make it higher, but if it proves to be a trifle too high a shaving or two may be planed from the base.

Rollers

These are made of a gelatinous substance so that they will remain soft and springy. They must be kept clean, dry and dustproof, and their ends supported so that the roller itself does not rest on anything or it will become flattened. They will last for months with careful treatment. Those for the Model presses may be easily renewed if a pound of roller composition is obtained together with a mould. Melt the composition in a double saucepan and vaseline

the inside of the mould (which is a brass tube). Place the iron rod, or stock, of the roller down the centre of the mould and pour the composition in. When quite cold and set it is removed, but should not be used for several hours.

Always clean the rollers and ink plate with paraffin or petrol after each job.

The Educational Potentialities of Printing

As a handwork subject printing develops skill, accuracy, and speed. It is a good plan occasionally to time each compositor and to set off against his speed in the first setting up the time taken in subsequent alterations.

The subject, under skilful supervision, also cultivates an artistic taste—in the selection of type, and its spacing between both words and lines; the setting out of titles and paragraphs; the question of margins, paper, and ink; and display work in the form of title pages, covers, programmes, and so on.

Every printer's proof, however simple, should be examined not only to discover every fault in grammar and punctuation, but from the point of view of design. The paper viewed some feet away should present a balanced pattern of black and white.

USEFUL PRINTING

The form shown in Fig. 15 is part of a booklet for the individual scholar. The pages are set out as required for Composition, Reading, etc. The arrangement of the lines may be varied, and suitable headings substituted, to meet the requirements of each subject.

If the press will take a forme about 5 in. \times 4 in. this mark book may be printed on sheets of foolscap cut lengthways—the pieces thus obtained, 13 in. \times 4 in., being folded to give four pages. The cover may be printed or left to the children to decorate with pen, brush, or lino-cut.

As the school library plays an important part in Senior education, each child should have a classified catalogue, which may be produced easily in the press. Its format will depend on the desires of the teacher, and as before suggested a dummy should be made and particulars

of each page entered thereon as a guide to the printer. If book title and author are to be printed they are set up in a line, then moved to opposite ends of the stick; then the space between them is filled with quads, or "leaders," which are the dots leading across a page: they

Other useful productions may include words of songs and hymns (be very careful not to infringe any existing copyright) made into booklets; descriptive labels for scientific, historical, etc., models; and so on almost *ad infinitum*.

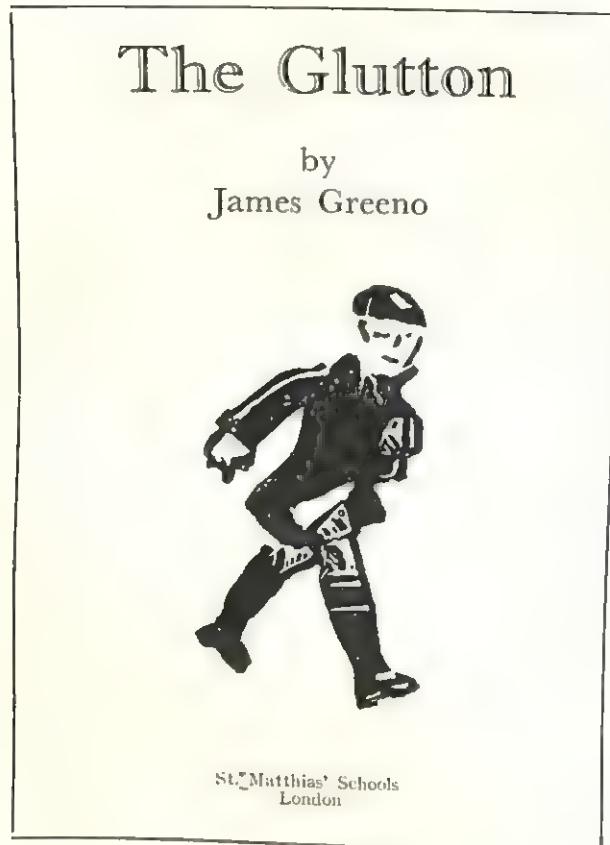


FIG. 17
A Title Page, including Lino Block
Set up in 24 pt. Imprint Shadow
12 pt. Baskerville, 6 pt. Old Style with lino block
(original size 5 X 4).

are type on a square base printing three dots, and may be used close or opened out with en or em spaces.

If details are to be given of some of the books such matter may be inserted in smaller type, and should be set in about one em.

For the library itself application forms, library cards, and book plates may be produced; this last giving scope for the lino-cut designer and the searcher for apt quotations.

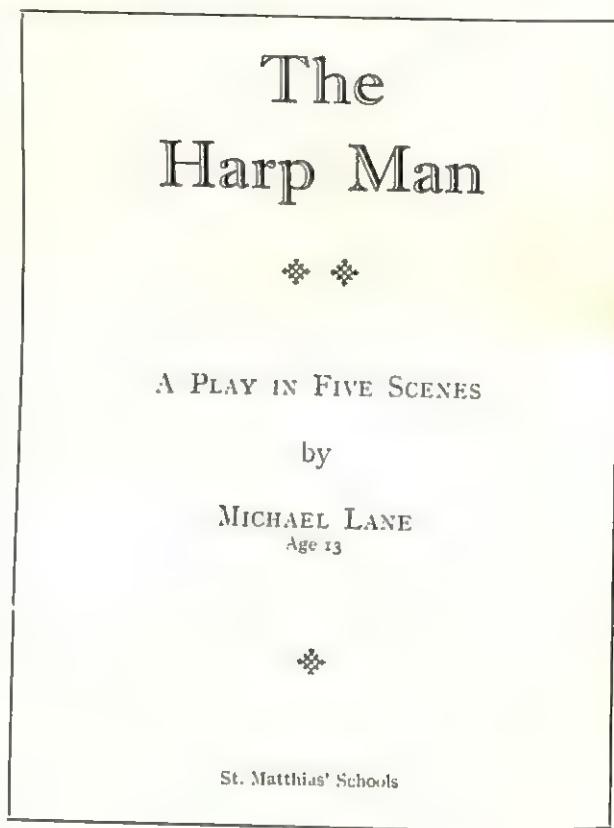


FIG. 18
A Title Page set up in Type Only
Set up in 24 pt. Imprint Shadow
10 pt. Old Style, 6 pt. Old Style with
three little ornaments.

PRINTING AND ENGLISH

The fact that a child may see his essay or story in print will prove a very strong incentive to good work both in originality and technique. Even the best composition is marred by alterations by teacher and scholar; if it can from this state be produced immaculate by the press, the child will feel the combined joy of artist and artisan. Hence there should be an opportunity for each child to attain the dignity of being in print and even printing it himself. In the latter

case every forgotten punctuation mark or carelessly spelled word will be brought home without fail as the work cannot be printed until correct; this is itself an invaluable aid in the English lesson.

Time and opportunity being against the printing of everything that is written, the teacher must get out some scheme that combines encouragement and selection.

The writer produced the form (Fig. 14) for his boys to fill in when they had read a library book, and on the reverse side of the paper an individual opinion of the book is written. These opinions are marked and the best ones are set up and printed by the writers. Each boy has a few copies for himself, while the rest are printed on double leaves so that a book is gradually formed.

There is no reason why the idea should not be applied to essays and a booklet of the best works of the term so produced; but for a long work of about 1,000 to 2,000 words the writer may produce it as a single complete work.

For such a book it is necessary to divide the number of words in the story by the average number of words which will appear on the printed page in order to find out the number of pages required. Page 1 is the title-page (see Figs. 17, 18); page 2 is blank or has a little ornament or a brief note (e.g. *Printed by the author, May, 1934*); and on page 3 is the title, sub-title, etc., and the beginning of the story, which may start with a large ornamental or illustrative capital. A dummy having been prepared, the composing may be commenced. If done page by page there will be no trouble when the estimated and actual words to a page

do not agree, but if two pages are printed at a time this must be allowed for. In this case the script must be marked off according to the estimated pagination, and a few lines extra allowed for at about the middle of the story, where a new chapter may be started. Then, if

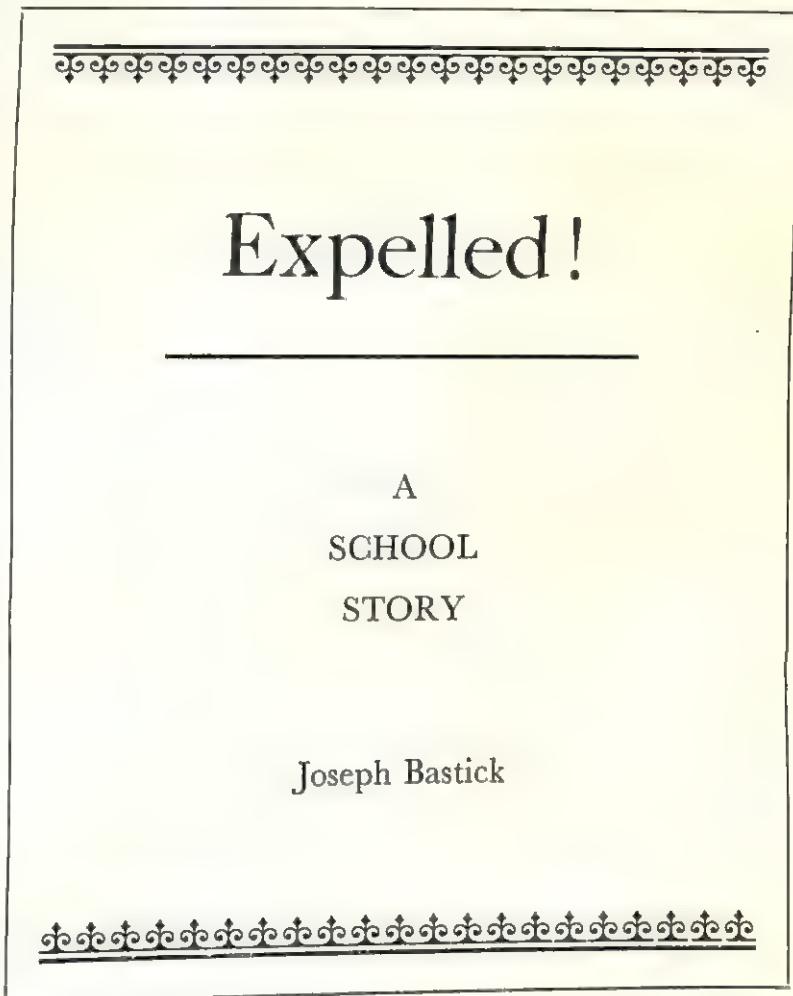


FIG. 19
A Cover

*Set up in 36 pt. Old Face Series; 12 pt. Baskerville.
a piece of brass rule and border ornament.*

there are to be 12 pages in the book, page 1 (title-page) and last page are printed; then pages 2 and 11, then 3 (commencement of story) and 10; and so on until 6 and 7 are reached. These are the middle pages and, if the work has taken up rather more space than estimated, the

extra lines allowed for will be filled. If, on the other hand, there is more room than estimated, the space may be occupied by an ornament or small lino block between the two chapters.

If there are several chapter or paragraph

The MAGPIE

Summer Number 1932



FIG. 20

Cover for School Magazine

The lino block printed in green ink on a light green stout paper. The title printed afterwards in black or blue.

headings, or—in a play—scenes, the space can be regulated more effectively page by page. The work is then sewn in a cover (such as Fig. 19), printed preferably on stout tinted paper. If enough type can be obtained to set

up the whole work before printing a lot of this scheming will be avoided.

The School Magazine

Although the production of a full-sized magazine is out of the question, yet a small one of about 3,000 words is well within the pupils' capacity. It may consist of stories, poems, articles, sports news, etc., written by scholars during the term in the composition lessons, and notes on school work by the teachers. A large lino block will illustrate the cover and small ones the various titles, and may be done in coloured ink before the text is printed. It would be best to select three or four of the most expert printers and make them responsible for the production, and appoint one pupil as proof-reader (with the teacher acting *ex officio*). In fact the more pupils brought into the business as editors, artists, contributors, printers and stitchers, the better.

If the pupils place all their contributions in an Editors' Box, there should be a good choice of suitable material for the Editors, who will aim at variety of topic and treatment. The artists may then get to work designing the cover and the headings for the articles and producing lino blocks of them. Fig. 20 shows a suitable cover, while the headings, initials, etc., must be proportionate to the sizes of the type and paper. Fig. 21 shows a simple heading for the Editor's Page.

The editors will reckon the number of words to a page—allowing sufficient space for the illustrations—and then get out a dummy magazine from which the printers will work. Each page must be very carefully examined by the proof-readers, and care must be taken in inking the machine, or some pages will appear blacker and heavier than others.

The Question of Time

Much of the work, such as writing the articles and proof-reading, comes in the composition lesson; the lino block and display work is part of the art lesson; while the composing and printing may be divided between the English and Handwork lessons.

The actual printing of about a hundred sheets



REPRODUCTION FROM THE COVER OF A SCHOOL MAGAZINE: LINOLEUM
CUT IN THREE BLOCKS, ONE PRINTING THE RED, THE SECOND THE GREEN,
AND THE THIRD THE BLACK

The Abbey School, Wycombe

will take very little time (about half an hour). It is the setting up, correcting, "make-ready" (getting the machine ready for perfect printing), and distributing that take the most time.

The setting up will take about an hour per hundred words at first, but after a little practice the rate will be about doubled. With a careful worker little correction will be necessary: one very quickly learns to read the type upside down, and if each line is read carefully as it is set up any mistake can be altered before another line is started.

The "make ready" should be carefully done to ensure good and even printing and register—the latter ensuring that all the pages have equal margins and that blocks (if printed separately in colour) line up accurately with the type. The teacher should supervise this especially.

The distributing can be done in much less time than the setting up, but accuracy must be insisted on, or the next person using the type will have a great deal of trouble. See also that the various spaces are placed in their proper divisions.

It will be advisable to appoint one or two boys as "Printers in Chief," and to make them responsible for the proper care and order of all the materials. They may supervise and help beginners, and they will be ready at any time to produce any small "job" that may be required.

Further Developments

As printing progresses in the school, the ambition to possess more material and to do bigger work will arise.

For good solid impression and speed in production a treadle press is of great assistance, and although a new one will cost £30 to £40 yet a good second-hand one may be obtained for about £12. With this the movement of the platen is mechanical and it remains almost stationary for a second when open, so that the printing paper may be changed. The young printers must be warned not to try to adjust the position of the paper as the machine is closing

or their fingers will be crushed between the platen and the forme. Slow work at first will soon form quick and accurate "feeding" of the press.

With such a machine—having a chase of about 7 in. by 11 in.—four small pages may be



The Magpie.
March, 1933.

Dear Readers,

Again has come my pleasant task

FIG. 21

Heading for a Magazine Page

A lino block, with Title in 24 pt. Imprint Shadow and 10 pt. Italic.

printed at one impression, thus introducing the complications of "imposition"; that is, placing the pages as set up in type in proper order so that when printed and folded the pages shall follow consecutively. To explain this to the pupils take a sheet of foolscap and fold it across the middle and then down the middle so that four leaves (joined at the top) are obtained. Then number the eight pages and open out the

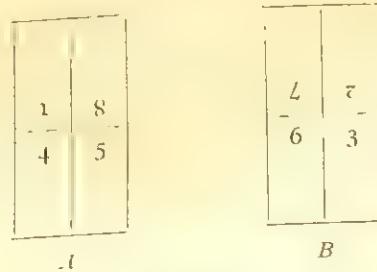


FIG. 22
Imposition

paper, and one side will appear as Fig. 22, A, and the other side as Fig. 22, B.

This is as they will appear when printed, so that the type will have to be the other way round and the printer may be left to work this out himself. It would certainly be advisable to number the pages as set up either at the bottom, in the middle, or at the top corner—right-hand side for odd numbers and left-hand side for even numbers.

Make certain that similar widths of furniture are used between pages (down the middle and across the middle), as these regulate the widths of the margins at the top and the inside of the page.

To do such work it will be necessary to have enough type to set up at least eight pages at a time, and this will call for larger type-cases. A proper type frame may be obtained second-hand for about 25s.—one complete with ten cases 22 in. \times 14 in. The cases may be upper, lower, double, or for brass rule and leads. Get what is most convenient, e.g. one for leads, three double for small fonts, and three upper and three lower for body type. The last can then be used by three boys at a time, and one or two halves of the upper cases may be used for titling font.

One pair of cases (an upper and a lower) may instead be used for a larger type (about 16 or 18 pt.) which will be most suitable for the younger boys as they start printing. It is quite a good idea to let boys, even of nine or ten years, set up some of their compositions. There is no need to teach the orthodox justification straight

away—let the boy set up the words with thick spaces between them, and when no more words can be got in the line fill up with spaces. Thus all the lines will be level on the left-hand side but irregular on the right—like blank verse.

If the top Senior class is doing some special study such as a history of their locality, a nature calendar, a study of a local industry, etc., the work may be printed a page or two at a time as convenient. Then at the end of the year a good-sized book will have been prepared for the bookbinders to complete as a very presentable and permanent record of work accomplished in the school.

BOOKS

1. *The Art and Practice of Printing* (Pitman), although a textbook for the professional, will be found invaluable for its information on type, justification and spacing, setting out of pages and display work, the use of initials, and so on.

2. *Printing* (Pitman: Craft for all Series, 2s. 6d.). A handbook for the amateur.

MATERIALS

1. Adana Agency, 17–18 Church Street, Twickenham.

2. Excelsior Printers, 41 Farringdon Road, London.

3. W. A. Parkes, Printers' Furnisher, 56 Sutherland Place, Wolverhampton.

4. Printer's Plant, Ltd., 62 Shoe Lane, Fleet Street, London.

POTTERY

Advantages of the Craft

POTTERY, except in its simplest forms, is a craft that is seldom undertaken in the Primary School, although it has many advantages to recommend it to the notice of teachers. In the first place, the processes are very many and very varied, and range from the easy to the extremely difficult. Most of the processes, too, are of such a kind that considerable practice is necessary before they can be carried out really well (as an example, one may instance "throwing," or painting under the glaze). This means that the child who practises Pottery will have developed in him a high degree of manual skill.

Secondly, there is, as the teacher who takes up Pottery will soon discover, a large body of knowledge connected with the craft, which forms a very valuable cultural background. One can hardly study Pottery seriously without giving attention to facts of History, Chemistry, Physics, and Art, and the enthusiasm with which the child will pursue his work in Pottery will almost certainly be extended to some or all of these subjects also.

In the third place, and contrary to the usual impression, the necessary tools and equipment are simple, inexpensive, and easily obtained, and the material of the craft, clay, is probably the cheapest of all craftwork materials. The provision of a suitable wheel and kiln has proved a great obstacle to many who have wished to take up the craft, but in reality these are quite easily devised and constructed. They will be dealt with in a later section.

I. Modelling, with Application to Pottery

It is often supposed by teachers that "Pottery" means chiefly "throwing" on the wheel, and, on the ground that they have no knowledge of this process, they are discouraged from taking up the craft. The fact is that "throwing" is only one of many processes, and while it is,

of course, the best method (though not the only one) of making round vessels, there is a multitude of objects which can be made by other methods. The early work in Pottery will consist mostly of modelling of various kinds, and wherever possible the objects modelled should be such as can be fired and so produce pottery objects. In the present brief article it is impossible to describe a wide range of processes and of models, so attention will be particularly directed to two examples, which are intended as types of pottery modelling only, and no doubt the teacher will be able to apply the methods to many other models.

The "Slab-Pot" Method

This method, which is suitable for all square or rectangular objects such as ash-trays, cheese-dishes, etc., is very much like cardboard modelling, except that a thin, even slab of clay is used instead of cardboard. First of all, a board is prepared by having nailed to it two smooth, thin strips of wood, the same thickness as the sides of the finished box are required to be, say $\frac{1}{4}$ in. The upper surface of the strips must be quite smooth, so the nailheads are driven below the surface. A square of material, such as part of an old sheet or tablecloth, is laid on the board (uncreased, and not quite touching the strips), and is pinned by the two ends as shown in Fig. I B. The clay, which should be all of the same consistency, and not too soft, is then placed on the cloth and beaten out flat, until it is just a little thicker than the two side pieces of wood. A ruler, or other strip of wood, is then used to scrape off the surplus clay and produce a perfectly smooth, level surface. The scraper should be held by the ends, and should project over the nailed strips.

A CIGARETTE BOX

Now the "development" of the model (Fig. I C) should be drawn on paper, a little larger than the finished model so as to allow for shrinkage

(probably about 1 in 10)—and remember to take into account the thickness of the clay. For instance, since the sides will be attached to the outside edges of the base, the lid will be longer and wider than the base by twice the thickness of the clay. The drawing is laid over the clay and the outlines are again gone over with a sharp pencil, with sufficient pressure to dent the clay below. The paper is then removed, and

together with a sliding movement, and pressed well into place. This must be done so thoroughly as to weld the two pieces of clay into one piece. When all the sides are attached, there will still remain a space at each corner, which should be filled in, in the same fashion, with one of the $\frac{1}{4}$ in. strips. The flanges on the underside of the lid can be similarly attached. Slip should also be used to stick on the handle. If desired,

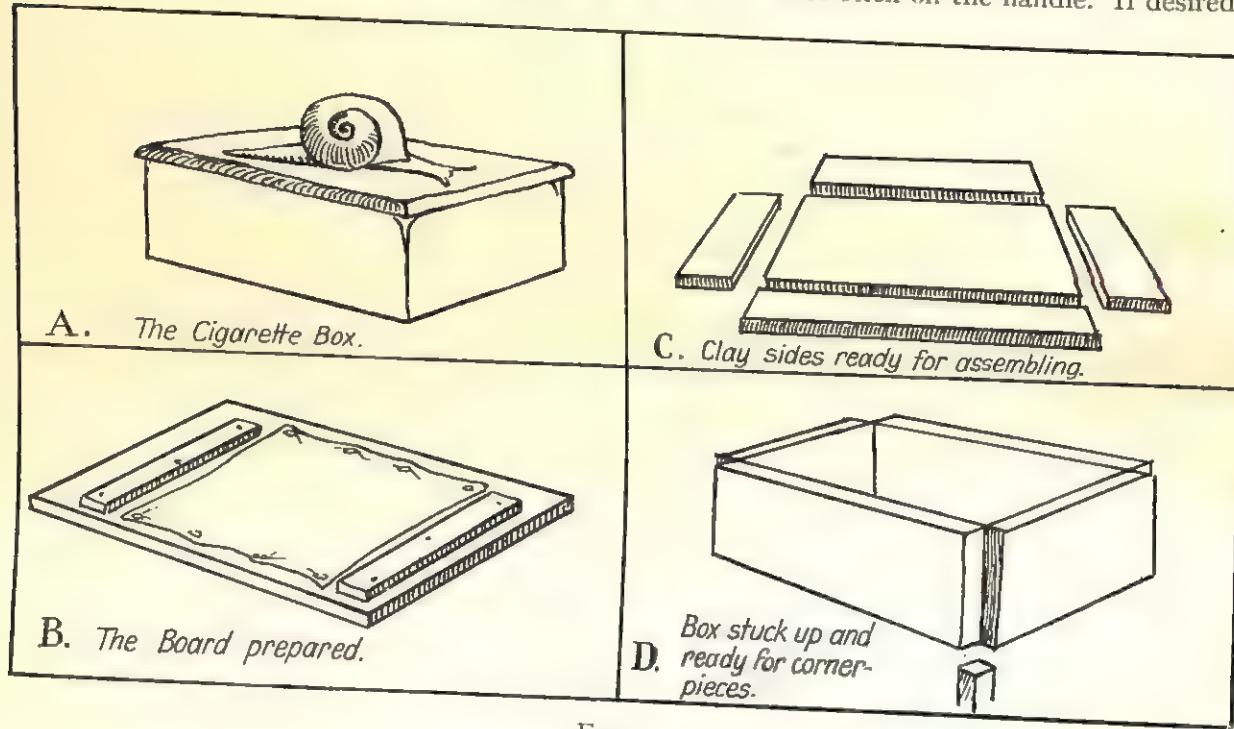


FIG. I
The "Slab-Pot" Method

the clay left until it is "leathery." The next step is to cut along the dented lines with a sharp knife. It is important that the cut edges should be at right angles to the surface of the clay, and, to help in holding the knife upright, it is best to use a straight-edge having a fair thickness. A metre-rule serves well. At the same time, a few strips, about $\frac{1}{4}$ in. wide, should be cut out. These will be used as filling for the corners, and flanges for the lid.

The box is then stuck up, as shown in Fig. 1 D, in the following manner. The surfaces which are to be joined are roughened, and then smeared thickly with slip (a creamy mixture of clay and water). They are then brought

this can take the form of an interesting knob. Children will delight in modelling something such as a snail, a frog, etc., for this purpose.

When the whole model is finished, and is bone dry, a high finish can be given to it by the judicious use of sand-paper. In particular, sharp edges should be avoided if the box is to be glazed.

The "Casting" Method

AN INK-STAND AND TRAY, MODELLED AND CAST

Some little prejudice seems to exist against the making, in school, of vessels which are cast,

instead of being modelled direct, or formed on the wheel, but this is entirely without real reason. The "casting" method may perhaps be abused, but nevertheless it is a most useful process, and indispensable for the production of many types of pottery. Figures will be reproduced by this method, and pottery cottages form most interesting objects and splendid

THE INK-STAND

This must first be modelled in the solid. It will take the form of a solid cube, or square prism, of clay, with the corners removed and hollowed a little. When this has hardened slightly, the lower half of the model should be embedded in clay, so that only the upper half is exposed. The clay surrounding the stand

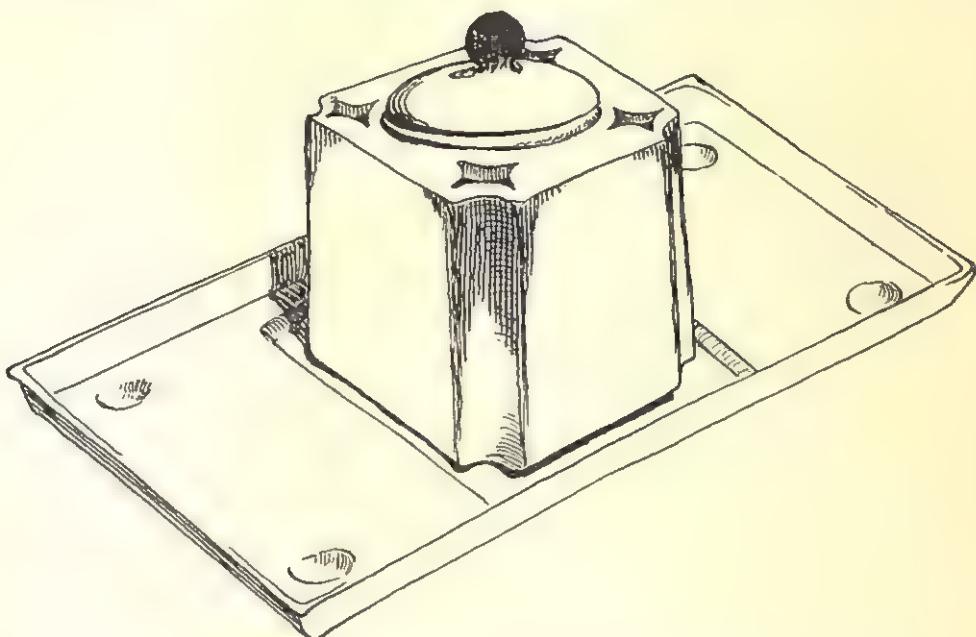


FIG. 2
The Ink-Stand
(*White-glaze with splashed green and orange*)

exercises in modelling and casting. The ink-stand and tray shown in Fig. 2 have been chosen for description on account of the simplicity of the casting process, and because it well illustrates the ingenuity which has often to be used when the making of a mould is in question. Also, the object is rather an unusual one, and will probably suggest to the reader a number of other models of a similar kind.

It will be seen that the group consists of four separate pieces, the stand, the tray, the ink-well, and the lid.

should have a smooth, level surface, making a very neat junction with the model, and extending some $2\frac{1}{2}$ in. all round the ink-stand. Then substantial clay-walls should be built all round the whole (Fig. 3 A), and projecting about $2\frac{1}{2}$ in. above the top of the model. It is now ready for the plaster to be poured: enough plaster should be mixed (with equal quantities, by bulk, of plaster and water) to bring the level of the mixture quite two inches above the level of the model.

When the plaster has hardened sufficiently, the retaining walls and the embedding clay can

be removed, and the plaster inverted, leaving the clay model now embedded in a solid block of plaster. Half the mould is now made. The second half is made by once more building the retaining walls, and pouring in plaster as before; but before this can be done, several things must be attended to.

First of all, three or four small "natches"

mould correspond with the opening for the ink-well. A piece of clay should be formed into a neat roll, having a diameter of $1\frac{1}{4}$ in., and this should be stuck vertically on to the centre of the clay model (Fig. 3 B). Thirdly, the exposed upper surface of the plaster must be rendered non-absorbent by being painted with olive oil.

The clay retaining walls may now be built up

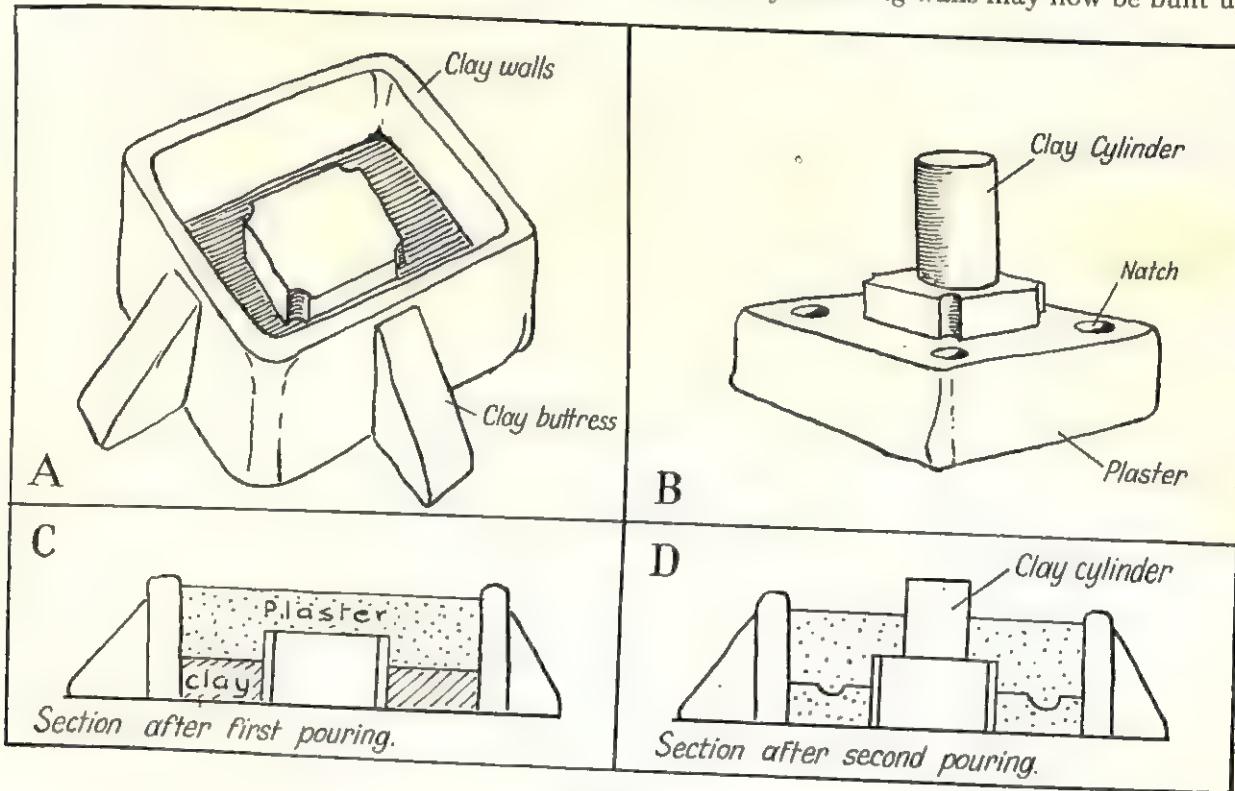


FIG. 3
The Mould for an Ink-Stand

must be made. These are circular depressions, and may be scooped out with the bowl of a spoon. When plaster is poured again, it will run into these natches, and form small domes or "joggles" on the second half of the mould. Without these, the two halves of the mould could not be made to fit together exactly. Secondly, it will be necessary to arrange to leave an opening somewhere in the second half of the mould for the pouring of the slip when a cast is to be made. Since the ink-stand is to have a circular opening in the top for the reception of the ink-well, it will be possible to kill two birds with one stone, by making the opening in the

again, and plaster poured in as before. As soon as it has set sufficiently, the mould may be trimmed, and then, when it has quite hardened, the two halves of the mould can be separated by driving a thin wedge between them, and then put to dry.

MAKING "SLIP"

Slip for casting is made as follows. Dry clay is powdered and sprinkled into warm water, thoroughly stirred, and passed through a fine sieve or "lawn" (No. 80 or 100), with the aid of a stiff brush. The consistency of the liquid should be the same as that of thick cream.

CASTING THE INK-WELL

When the mould is perfectly dry, it should be very carefully cleaned with a moist sponge, assembled and firmly tied up, leaving the opening free. Then it should be filled with slip, taking care to avoid bubbles. When the mould is filled, it will be well to cover the opening with the palm of the hand, and invert the mould for a moment, so as to dislodge any air which may have collected in the upper corners.

The slip will quickly sink in the mould, owing to the absorption of water by the plaster, and it will be necessary to keep on adding more slip, until the thickness of clay deposited on the sides of the mould is thick enough. This can be tested from time to time by scraping the mouth free of clay. Then the surplus slip is poured out again, and the mould left, inverted, to drain. After an hour or so the mould can be opened, after easing the clay round the sides of the mouth. As soon as the shape is tough enough, and before it is dry, it can be trimmed; if the holes shown in the corners of the ink-stand are required, they should be cut out at this stage.

THE TRAY

A purchaser who gave an order for a tray to match an ink-stand which had previously been acquired, unwittingly set a pretty problem for the boy who was set to carry out the commission. He solved it in ingenious fashion. The tray was modelled solid as though inverted (Fig. 4). For this, a slab about $\frac{1}{10}$ in. thick was run out on a board, as though for a slab pot, and a rectangle $7\frac{1}{2}$ in. long and 4 in. wide was cut out, and the edges bevelled. Then a smaller slab 3 in. square, and $\frac{1}{16}$ in. thick, was similarly made and laid in position in the centre of the larger slab. Two small pieces of clay were rolled between the palms, cut into two pieces, and the four hemispheres arranged in the corners, as shown in the diagram. To complete the model, all sharp edges were rounded a little with the fingers.

To make the mould, clay walls were erected, and plaster poured in as previously explained. In order to take a cast from such a mould as this, it is only necessary to fill it with slip, and keep it full until the clay deposit is thick enough,

when the surplus slip should be poured out, and the cast left to harden.

INK-WELL AND LID

There only remain the ink-well and lid. The former can be thrown on the wheel, or otherwise easily modelled as a small "thumb-pot." The lid should be modelled.

"Agate Ware"

Before leaving this subject, it may be mentioned that very interesting effects can be

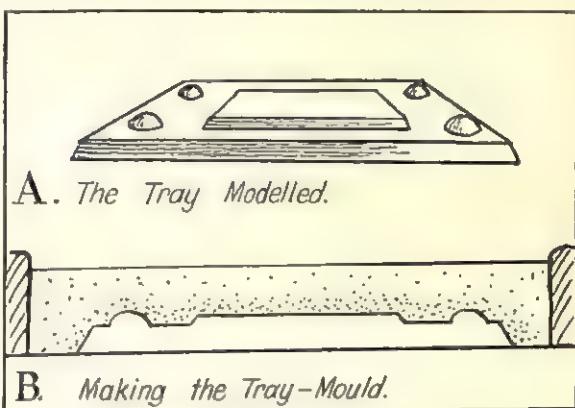


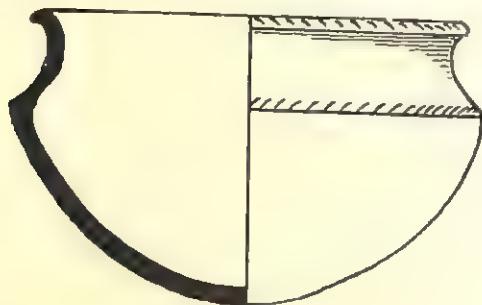
FIG. 4
Tray for Ink-Stand

obtained when casting, by partly mixing two differently coloured slips. Suppose blue and white are chosen, then a quantity of blue slip is prepared by lawning together white clay and a colourant, such as Cobalt Oxide, in proportions differing according to the tint required (say 1 : 8, dry weight). Then a quantity of blue slip is carefully dropped into a jug containing white slip, and a single stir is given with a stick. If this partial-mixture is used for the cast, the result will be a pot much resembling marble. It will be, in fact, the "agate ware" of Whieldon and Wedgwood.

2. Thumb-Pots

To make a thumb-pot, a ball of clay is hollowed by the thumbs, then, the thumbs still being kept inside, and the fingers of both hands being held firmly against the outside of the

clay, the sides of the pot are squeezed and pulled up until they are of the required thickness. If the shape is still not high enough, more clay is added to the top, and the process of squeezing



Typical Neolithic Pot.
(Windmill Hill variety)

FIG. 5

and pulling continued. The tendency will be for the pot to widen out and become unmanageable, but, if the fingers are kept on the outside and allowed to do most of the work, this will be prevented.

This, of course, is a primitive method, but is even now used in various parts of the world by backward races. It is the method by which pottery vessels were made in our own country during Neolithic times. Because it is primitive, it is usually mistakenly regarded as being easy, and on that account it is generally the first method taught to beginners in Pottery. When the first few attempts result in nothing but small and shapeless pots, it is often given up in despair. As a matter of fact, this particular way of building up a pot is a very valuable one, and shapely and interesting pieces are quite within a child's ability to produce. It is probably a good plan to teach it as a first pottery method, but to return to it over and over again, as the child becomes more skilled in the manipulation of clay.

Historical Work

Mention has been made of British Neolithic Pottery. Recent excavations have brought to light many pieces of this ware, displaying simple

but satisfying shapes, and extremely interesting forms of decoration. Fig. 5 will give an idea of the shapes, and Fig. 6 shows a thumb-pot made by a boy in imitation of a Neolithic vessel, with decoration consisting of the impressions of a piece of twisted cord, made while the pot was still soft. Later Neolithic pottery (classed as "Peterborough Ware") was usually decorated in this fashion. The markings shown are very characteristic, and are known as "maggots."

Raised Decoration

Sometimes the "maggots" were in relief. To produce these, a pot of suitable shape could be made, and, while it was still soft, cord impressions could be made on the *inside* of the vessel. When fired, this could be used as a mould, further pots being made by lining it with clay. The shrinkage consequent on drying would allow the pot to be lifted out, and the impressions in the mould would be reproduced on the new pot, in relief.

It will be seen that there is considerable scope



FIG. 6
Imitation Neolithic Pot (Peterborough Type)

Note twisted cord decoration. This thumb-pot was made by a Senior Boy.

in the thumb-pot method, and, if full use is made of the wide historical background, it can be a very stimulating method too.

3. Coiled Pots

"Coiling" is probably the best known and most widely practised of all methods of making pots in schools, and it has this in common with the thumb-pot method, that, while it is quite suitable for young children, it is also well adapted for use in the Senior School. Beautiful and dignified shapes may be made, and have been made in the past, by coiling. A brief description of the method will suffice.

Making the Roll

Probably it will be necessary for the children to have some preliminary practice in the making of clay rolls. First of all, a piece of rather soft clay is taken in the hands and squeezed into a rough cylinder. This is placed on the bench, and rolled out with the palms of the hands into a long, even roll of about $\frac{1}{2}$ in. diameter. This is not so easy as it sounds. The two hands should be placed in the middle of the roll to begin with, not parallel, but rather inclined a little towards each other (Fig. 7 A). A fair pressure should be exerted, the hands meanwhile separating more and more, and thus pulling out the clay. should do more work than the palms, but, unless the clay is rolled backward and forward for a distance sufficient to allow it to make a complete revolution, the roll will be flattened. When this has been mastered, a pot may be attempted.

Building the Pot

A ball of clay should be beaten out into a round, flat "cake" of suitable size and thickness to form the bottom of the vessel. Then the sides are built up by coiling long rolls of clay round and up. Each ring should be firmly joined to the one below, by forcing the clay down over the lower ring, both inside and out, with the thumb of one hand, while the other

hand is used to support the side of the pot, so as to preserve the shape (Fig. 7 B). In the case of large and heavy pots, it is best to complete the work in easy stages, allowing the lower part of the vessel to harden a little before the upper part is added. It is important that the welding process should be thoroughly carried out. Much coiled pottery fails in this respect, with the result that, during drying, cracks appear where the coils have been joined.

With practice, a considerable variety of



FIG. 7

A. Making the Roll

B. Welding the Coils

The fingers

shapes can be made by this method. Its great advantage is that very large pots, which it would be almost impossible for a child to throw on the wheel, can be made by coiling. The usual fault is that children attempt to coil small, thin-walled vessels, and this is almost an impossibility. A small pot, too, calls for a high finish, and for accuracy of shape, whereas a slight irregularity of shape is not a grave defect in a vessel of more massive proportions. It is much better to use rolls as thick as a finger, and to attempt pots of good size but simple shape.

Bronze-Age pots were mostly coiled, and children could with advantage make a study of this ware, while learning the coiling method. It consisted almost entirely of three types, "beakers," "food-vessels," and "cinerary urns," all models of fitness, both of form and of

decoration. It will be found that a careful study of these will both help to cultivate in a child a feeling for good and simple shapes, and stimulate his interest in History.

4. Throwing

By "throwing" is meant the making of shapes on the potter's wheel. It is by far the most fascinating of all the pottery processes, but it is also the most difficult to master. Hours of concentrated effort will be necessary before the pupil is able to throw even simple shapes;



A. Centring the Clay

but when at last the art has been acquired, great will be the joy of achievement.

A description of the wheel itself will be left till a later section, but it may be mentioned now that, if a treadle wheel is used, it will be best to allow a beginner to have another pupil to treadle for him at first, so that he will not be discouraged by having too many things to attend to at once. Later on, he can learn to treadle for himself.

Centring the Clay

Clay for throwing should not be too soft, but should be thoroughly wedged, i.e. it should be perfectly homogeneous and free from air bubbles. To ensure this, take a double handful of clay, tear it across, slap the two pieces together violently, then tear across again, and wedge together at a different angle. This is continued, using a good deal of force, till the



B. The Clay Hollowed



C. Pulling Up

clay is of even consistency. A small piece is then torn off, and knocked with the palm of the hand into a round ball. The wheel should then be revolved in an anti-clockwise direction, and the clay thrown firmly on to the centre. The right hand is then dipped into a bowl of water placed conveniently to the right of the wheel head, and, while the wheel revolves rapidly, the clay is gripped with both hands, and forced firmly on to the exact centre of the wheel. This, the first stage, is known as centring. While the clay is not in the precise centre of the wheel, it will "wobble" as it revolves, and it will tend to force the hands which grip it to wobble also. This tendency must be overcome, although it will require surprising strength. The practised thrower seems to centre without effort, but this is an illusion. In reality his arms and wrists are rigid as iron. The elbows should be kept well into the sides, and the forearms can rest firmly on the edge of the trough (Fig. 8 A). From time to time the right hand should be wetted again. When the clay is dead centred, it should be squeezed up into a tall cone, then pressed down again into a low dome. This is the first step, and until it is mastered nothing further should be attempted, even though it should take half-a-dozen lessons.

Hollowing the Clay

The clay having been centred, the next step is to hollow it. The hand is again moistened, and the clay gripped as before, but with the right

thumb exactly in the middle of the dome. The thumb is then pressed firmly into the clay so as to hollow it, but care must be taken to stop before reaching the wheel head. The thumb, like the wrists, must be quite rigid, and any tendency to "wobble" must be killed at once. If now the thumb is carefully and firmly drawn in towards the palm of the hand, the hollow will be widened and the clay will assume the form of a squat bowl.

Pulling Up

The fingers of the left hand can now be inserted, and the sides of the clay pulled up slowly, using chiefly the side of the forefinger of the left hand, and the knuckle of the forefinger of the right hand (Fig. 8 C). The rigidity and position of the arms must be maintained. There is often a tendency to make the bottom of the walls too thin before the top is drawn up (sometimes the result of using the tip, instead of the side, of the left index finger). In this case the top of the pot will most likely be twisted off. The aim should be to get gently tapering walls, with a slightly thickened top. When the required shape has been obtained, it can be cut from the wheel with a fine wire, and put away to harden.

The best shape for children to begin with is a small jar, say about 3 in. in diameter, and 2 in. high, which could be used as a salt pot. A second model could well be a small bowl, produced by making a rather thick-sided jar as before, and pulling out the sides to the required shape.

Trimming

It is not often that the pot can be left exactly as it comes from the wheel. The bottom is usually untidy, and often thick and heavy, so as to require hollowing on the underside. The foot of a vessel such as a bowl cannot well be shaped at the time of throwing. In the case of lids, too, the exact shape and size must be obtained by trimming the thrown shape, when the clay is partly dry, or "leathery" as it is called. In the case of the small jar already mentioned, the process of trimming would be as follows. A small dome of clay, of a size and

shape convenient for fitting *inside* the jar, is accurately centred on the wheel. A small square of linen is placed over it so as to protect the model, and the jar is firmly fitted in an inverted position over the dome. It is important that this should be done so that the model spins perfectly evenly when the wheel revolves. Then the sides can be shaved, and the base hollowed as required. The blade of a penknife, or a piece of sheet zinc cut to a suitable shape, is the only tool required. In trimming, the wheel revolves as for throwing, and the tool is held in the right hand, with the cutting edge turned a little away from the direction in which the clay is revolving. If a perfectly smooth finish is desired, the pot can be polished with the side of an ordinary wooden modelling tool, while still in position on the "chuck." The finished pot can be put aside till it is bone dry, when it is ready for the first fire.

5. Decoration

There is an endless variety of ways in which pots may be decorated, ranging from those requiring little skill (though much taste) to others which demand considerable practice, and some natural aptitude. There is no space in the present short article to do more than describe very briefly a few of those methods which are most useful in school, not only because they are most suited to children's use, but also because each is connected with a body of historical facts, attention to which will add still more to this craft's considerable value as an educational instrument.

Impressed and Incised Decoration

The twisted cord impressions found on Neolithic pottery have already been mentioned. The reader who wishes for further information regarding this fascinating form of decoration might consult *Archaeological Journal*, Vol. LXXXVIII. Given a start, children will show much ingenuity in the twisting and plaiting of string so as to produce interesting impressions. The great advantage of the method is that it calls for no skill in drawing. Just as it was the form of decoration which came earliest in the history of the race, so it is the form most

suitable for the youngest children, or for the beginner in pottery.

Next in order of difficulty, and next also in chronological order, comes the incised decoration such as that found on Bronze-Age pottery.

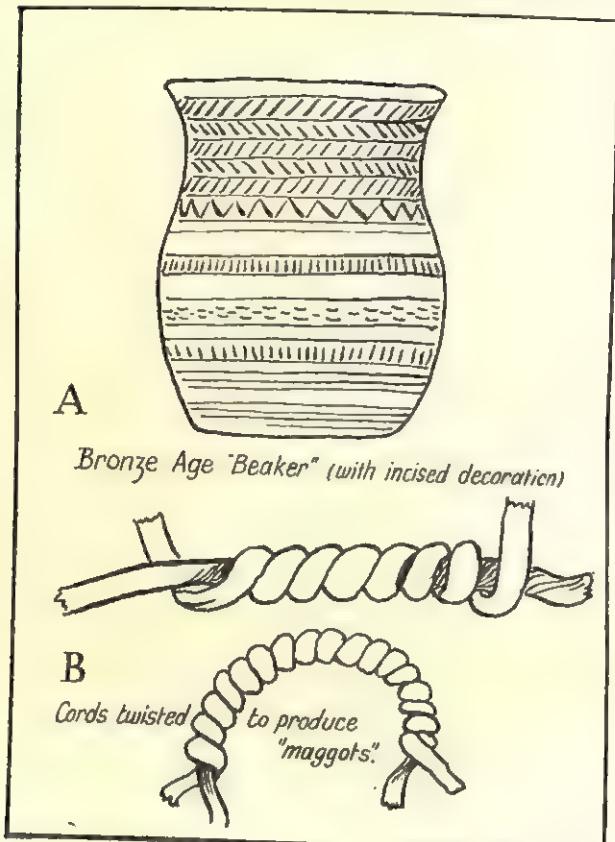


FIG. 9
Incised and Impressed Decoration

This ware was ornamented almost entirely with geometrical patterns made up of straight lines, arranged in bands round the pot, and executed by scratching the undried clay with a pointed stick (Fig. 9 A). It would be incongruous to apply some refined type of decoration to such a surface as that obtained on coiled or thumb-pots. For these vessels there is still no decoration more fitting than the forms described above.

Romano-British Pottery

This was very frequently decorated by means of impressions made probably with small wooden dies. The commonest form was that known as

the "rosette," of which types are shown in Fig. 10. Dies for this work can be cut quite easily in wood or, better still, in clay. If a short cylinder of clay is rolled out, one end cut square, and left until leathery, the pattern can be drawn on the end, and the waste cut away fairly deeply, so as to leave the design in high relief. The die thus prepared can be fired, and ought perhaps to be glazed to get the best results. Even wheel-thrown pots can be decorated effectively with dies made in this fashion.

Slip Decoration

The application of clay slip of different colour from the clay forming the body of the pot is one of those simple and natural processes which one would expect to find employed almost wherever pottery has been made. It is found, used to perfection, on Romano-British ware. It had a remarkable growth in England during the seventeenth century, when it was practically the only method employed by the peasant potters.

Slip may be used in a variety of ways, but it should always be applied to the green clay, immediately after trimming, and while still moist. It may be applied as dots or lines formed by trailing from a "slip-can," a vessel something like an oil-can with long narrow spout (specially made "slip-tracers" can be purchased also). Or it may be used as a wash to cover all, or any part, of a vessel, the design being afterwards scratched through the slip, showing the differently coloured body beneath. This is a splendid method for school use, and follows naturally after the other "incised" methods mentioned. The only difficulty is in getting a perfectly even coat of slip on the vessel. When the pot has been trimmed, it may be left on the wheel, and while revolving, the surface should be rendered sticky with a wet camel-hair mop. The mop can then be dipped into the slip, which should be fairly thick, and again applied to the revolving pot. Another method is to spray the slip, as explained below for glazes.

The "Majolica" Method

If oxide of tin be added to a transparent glaze, a perfectly opaque white glaze is produced, which forms a splendid ground on which

to paint coloured decoration. The opacity of the glaze makes it possible to use a coarse body firing buff or even red, since it will be entirely concealed by the tin glaze. This will add considerably to the uses which can be made of any local clays, dug and prepared by the children themselves.

As a rule, when painted decoration is required,

There are also, of course, the most common forms of decoration consisting of the application of coloured glazes, or of painting either under the glaze, or on the top of the glaze after firing. For information regarding these the reader is referred to textbooks of pottery, the whole subject being much too wide to be entered into here.

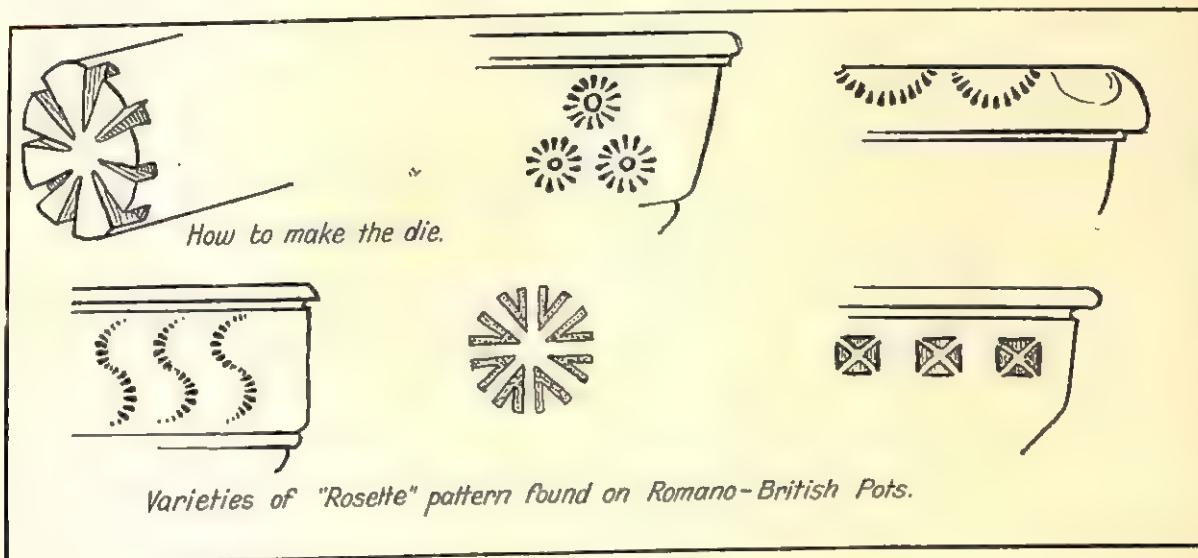


FIG. 10
"Rosette" Decoration

it is applied to the biscuit in the form of specially prepared "under-glaze" colours, and covered with a transparent glaze. It will be obvious that if an *opaque* glaze be used, then the decoration must be painted *over* the glaze, preferably before firing. Since the unfired glaze will appear on the pot as a coating of white powder, it will be seen that this is no easy matter. No previous drawing will be possible, and the brush strokes must be free and rapid, and accurate, because no correction is possible.

Pupils who use this method will very soon perceive the necessity of employing in their patterns very few lines, and of making those lines as significant and as beautiful as possible. It is the writer's experience that no method of decoration is capable of developing in the children a greater degree of skill in drawing than the "majolica" method.

Applying the Glaze

Either the vessel itself may be dipped into the glaze mixture, or the glaze may be painted, poured, or sprayed on to the pot. Nowadays, in potteries, spraying is the method generally adopted, the sprays being worked with compressed air, and the pots being placed on a revolving turn-table. Usually this method is never considered in schools, as it is thought that complicated and expensive apparatus is necessary. As a matter of fact, a simple diffusing spray, such as those commonly used by gardeners to spray plants with insecticide, will do perfectly well. These instruments have a drum attached, which can be filled with glaze mixed to a thinner consistency than when used for dipping. In the absence of a turn-table, the vessel can be placed on a stand (an upturned box will do), round which the potter must walk,

spraying as he goes. With a little practice, a very thin, even coating can be applied.

The great advantage of the method is that very little glaze need be mixed. To dip a large pot will require a pailful of glaze, an expensive matter in schools where funds are not too plentiful. But a single drum of glaze will cover quite a number of pots, and it can be used to the last

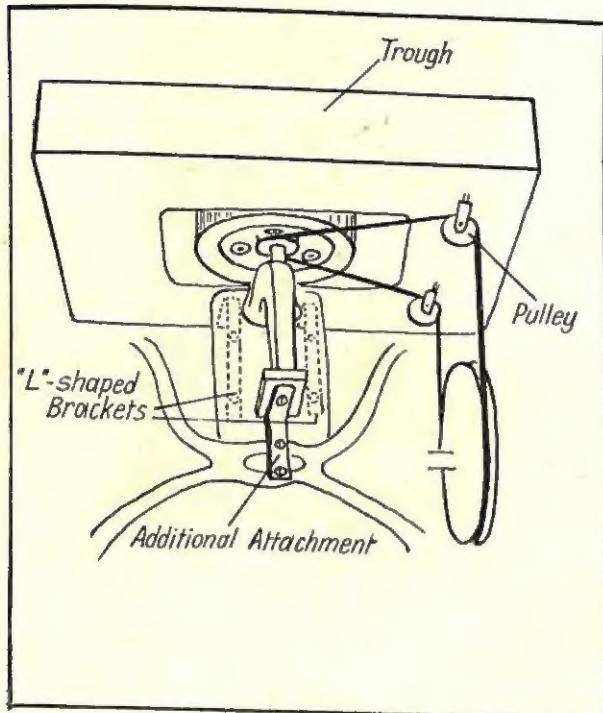


FIG. II

Adapting Sewing Machine as Potter's Wheel

spoonful. The chief disadvantage is that a good deal of the liquid will be wasted, as much of the spray will fail to strike the pot. This may be obviated to some extent by placing a zinc-lined box on its side, with the pot in the opening. After glazing, much of the surplus can be poured out of the box, and thus saved. In any case, the spraying should, if possible, be done out of doors, as otherwise there is a danger of breathing in the finely divided glaze material.

6. Equipment

Few crafts of importance require so little or such simple equipment as pottery. A zinc dust-

bin with closely fitting lid is best for storing clay, and ordinary stew-jars are excellent for keeping prepared glazes. The only considerable pieces of equipment are the kiln and the wheel; and as each of these presents peculiar difficulties, it will be best to deal with them separately and at length.

The Kiln

Kilns were unknown in this country before Roman times, and pots were probably burnt in the middle of an open fire. When thumb-pots or coiled pots of large size are being made, they can very well be biscuited in this fashion, although, unless the work is very carefully done, there will be considerable wastage from blown-out pots. It is sufficient to rest the vessels, inverted, on bricks, and preferably in a shallow trench. Then the fire can be built up round them. It is essential that the fire should be very small to begin with, and it should be made to burn slowly for two or three hours. Then as the pots become hot, thorns and branches can be piled over them, until in the end the pots are in the centre of a bright, open fire.

Of course, to fire in such a fashion is to teach history rather than pottery. The woodwork instructor would scarcely feel himself justified in teaching children to use the adze instead of the plane, no matter how historical its use, and, similarly, primitive methods of firing are not a substitute for a real kiln, though they certainly have their place in a scheme of pottery instruction. The teacher ought to aim at procuring the most efficient kiln available in his own particular circumstances. If he is very fortunate, he may be able to install an electric or gas kiln. These, of course, are much the easiest to manipulate, and probably the most efficient. However, on account of the expense, it is usually impossible to do this, and the teacher must fall back on a coal kiln.

A number of plans for such a kiln have been published, and are available, and from these the teacher can make his choice, but in any case the kiln chosen should be of the "muffle" type. That is to say, it should have a fireclay receptacle for the pots, with flues so arranged as to carry the flames all round the muffle, except

perhaps the front. Quite a small kiln is best, because then the process of firing need not be prolonged beyond the limits of a school day. If it can be arranged, by far the best place for such a kiln is the school heating chamber. The flue can then be run into the main flue of the school stove, and a sufficient draught is assured. In addition, fuel is available, and there is shelter and warmth. Even if this is not feasible, it may still be possible to make use of an existing chimney stack, for a good draught is absolutely essential to success.

In at least one Senior School the scholars themselves have built their own kiln.

It is only fair to warn the reader that the firing of a coal kiln is a difficult matter, and success is hardly to be expected at a first attempt. The tendency usually is to allow the fire to burn too low before feeding it, and then to pile on a good deal of coal. On the contrary, the fire should be fed very frequently, and the baitings should be small.

The Potter's Wheel

Generally speaking, the various wheels on the market have this disadvantage, that they are intended for adults rather than children. A wheel should be sufficiently low for the worker to get well above the work, or it is difficult to get the rigidity of the arms which is so necessary in throwing. However, a very satisfactory potter's wheel can be made easily and cheaply from any old treadle sewing machine, in the following manner—

Obtain an old sewing machine (the older the type, the easier it is to adapt), and remove the head of the machine from the base. This will discover an opening in the table of the machine, which will probably need enlarging a little. When any unnecessary parts (spool winder, etc.) have been removed from the machine head, it is held vertically, with the grooved fly-wheel at the top, and lowered through the opening in the table, until the top of the wheel is level with the table top, the grooved portion of the wheel being consequently just below the table (Fig. 11). It can be fixed firmly in this position by using a couple of L-shaped brackets fixed as shown in the sketch, or in various other simple ways

easily devised to suit the particular pattern of machine used. It is important that the machine head should be so fixed as to be perfectly rigid, and so that the fly-wheel revolves in a true horizontal plane. A strong wooden wheel-head should then be turned, recessed underneath so as to allow it to be slipped over the fly-wheel, and then screwed firmly on. This wheel-head is



FIG. 12
Finished Wheel

best made of sycamore, and should be about 8 in. in diameter, and at least 3 in. thick, so as to give as much weight as possible. Two pulleys are then screwed into the underside of the machine table, and directly over the sides of the large driving wheel. The machine belt is carried over these pulleys and round the grooved portion of the fly-wheel. It then only remains to build a shallow trough round the table, and the wheel is complete.

Such a wheel as this has certain obvious advantages. It is low enough to be conveniently used by children of eleven or twelve. The treadle movement is probably easier than the kicking movement of the kick-wheel. The wheel-head revolves at least three times as rapidly as that of the kick-wheel, and this is a great advantage when centring and hollowing the pot, and later on when trimming. Lastly, of course it is cheap. If all the work had to be paid for, the total cost would probably not exceed one pound.

Some Pottery Materials

Success in Pottery depends largely on the use of a suitable clay. When the craft is in full swing, a variety of clays will be used for special purposes, but in the outset it will be necessary to use a clay which is very plastic, of good colour (i.e. white or cream after firing), and which has a reasonably low firing point. A clay should be rejected if it will not give a good firm biscuit at 1100°C . or less. Perhaps clay is best purchased from a pottery, but, whatever the source, the teacher should satisfy himself that constant supplies of exactly similar clay will be available in future.

LOCAL CLAYS

In many districts there will be found some clay which it will be possible to prepare in school and make up quite satisfactorily into pots. It may be red or yellow, owing to the presence of iron, and in this case it will, on firing, assume a good red colour like that of a plant-pot. For many purposes this is no disadvantage. Such a clay is prepared as follows. A quantity is placed in a bucket, covered with water, and allowed to stand for several weeks. This breaks down the harder pieces. The mixture is then stirred with a strong stick, until it is of a thin creamy consistency. It is then brushed, with a strong brush, through a "lawn" (No. 80 or 100). It is now "slip," and it would be as well to preserve a quantity for future use in making casts. If the remainder is poured into a shallow sand-tray, and the surplus water siphoned off from time to time, it will soon dry sufficiently to be wedged into condition for working. A quicker way of drying is to place a quantity of slip on a large slab of plaster. This absorbs the water, and leaves the clay ready for wedging after a few minutes.

COLOURED SLIPS AND BODIES

These are prepared in very much the same way as explained above. The colourants (chiefly metallic oxides) are known as "body stains," and a wide range of colours can be purchased under this name. The proportion of stain to clay will depend on the strength of the colourant being used, and the depth of colour required. Cobalt, for instance, is a strong colourant, but

iron is very weak. Generally, however, one part of oxide to 8 or 10 of clay (dry weight) will be required. The clay should be broken up small, placed in warm water, and stirred ready to brush through the lawn. Meanwhile the stain should have been mixed with a little boiling water, and allowed to stand overnight. The stain is now mixed with the clay, and the two brushed together through the lawn (No. 100). This will produce a coloured slip. If the slip is dried off as explained above, it will give a coloured body.

(Note. White clay only should be used when making coloured slips or bodies.)

MATERIALS FOR UNDERGLAZE PAINTING

Painting over the glaze is too difficult a process to be employed to any great extent in schools, and painted decoration will generally be applied to the biscuit, under the glaze. As the colourants used will be subjected to the full heat of the glaze oven, only those substances which remain stable at a very high temperature can be used. Metallic oxides are safe, and dealers also supply specially prepared "underglaze colours," which can be purchased cheaply. The colours can be mixed smooth with a little water and applied with a brush direct to the unglazed pot, but as in this case they are so easily wiped off, and might indeed be washed off when the glaze is applied, it is best to add a little gum to the water when mixing. A thimbleful of Gum Arabic to a teacupful of water is sufficient. Treacle will do as well as the Gum Arabic, except that it does not keep so well. A very little glycerine (one or two drops) will make the colours work more smoothly, if any difficulty is experienced in this respect.

PRINCIPAL METALLIC OXIDES USED AS "BODY STAINS" OR AS "UNDERGLAZE COLOURS"

1. Iron (black or red oxides)	Produces reds, yellows, and browns.
2. Copper (red, green or black oxide)	Produces greens chiefly, but blue, turquoise, and crimson under certain conditions.
3. Nickel	Produces greens.
4. Cobalt	Produces all shades of blue, blue-green with copper, black with iron.
5. Chromium	Produces greens and yellows.
6. Manganese	Produces browns and purples.
7. Titanium	Produces yellows.
8. Tin	Produces white.

